B&W Tests

1G B&W RR (uu) New Style, "Medium Part"

2B "

2E "

2A "Large Part"

2A vs. 2B A 95%
B 95%

Printed out for: UNIT2OP - 29-Dec-04 15:23:38
0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 15:23:38

Unit 2 953.8 MW	Large Pulv A	Medium Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow392.4TPH	64.7	64.2	52.5	52.6	53.5	BadI	53.5	52.2
Feeder Speed	94.5	96.2	78.6	78.0	78.6	Calc	77.4	76.6
Amps(Duct Pr57.2)	64.5	70.5	65.8	68.6	76.0	0.0	61.2	73.2
Coal Pipe Vel	4825.	4841.	4831.	4893.	4940.	5.	4896.	4891.
PA Flow %	98.2	98.3	98.3	100.	100.	0.1	100.	100.
PA Damper Pos (Duct Pr	87.7	74.9	70.8	75.1	79.4	0.0	100.	80.1
SA Damper Pos	91.3	90.8	73.5	78.1	78.5	28.0	74.4	74.2
PA Mass Flow	3907.	3886.	3899.	3955.	3955.	4.	3955.	3955.
Pulv DP(NOx 0.31)	23.1	27.0	17.4	18.4	24.3	0.0	21.6	20.6
Air to Fuel Ratio	1.82	1.77	2.18	2.24	2.22	Calc	2.24	2.27
Pulv Inlet Temp	463.4	465.7	350.0	360.4	371.2	104.5	335.4	379.4
Pulv Outlet Temp	140.8	147.3	141.8	140.6	146.4	102.0	140.9	140.8
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	0.0	0.0
Air Bias	0.0	0.0	10.0	10.1	9.9	0.0	15.0	10.1
Hyd Skid Pr Fdbk	2296.	2406.	2464.	2268.	1849.	748.	2446.	2036.
Hyd Skid Pr Setpt	2400.	2400.	2346.	2347.	2378.	1149.	2350.	2349.

EndTim= 29-Dec-04 15:23:38 /EvalTim= 29-Dec-04 15:23:38 /PanRate= 0

B Mill

Printed out for: UNIT2OP - 29-Dec-04 15:23:46
0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 15:23:46

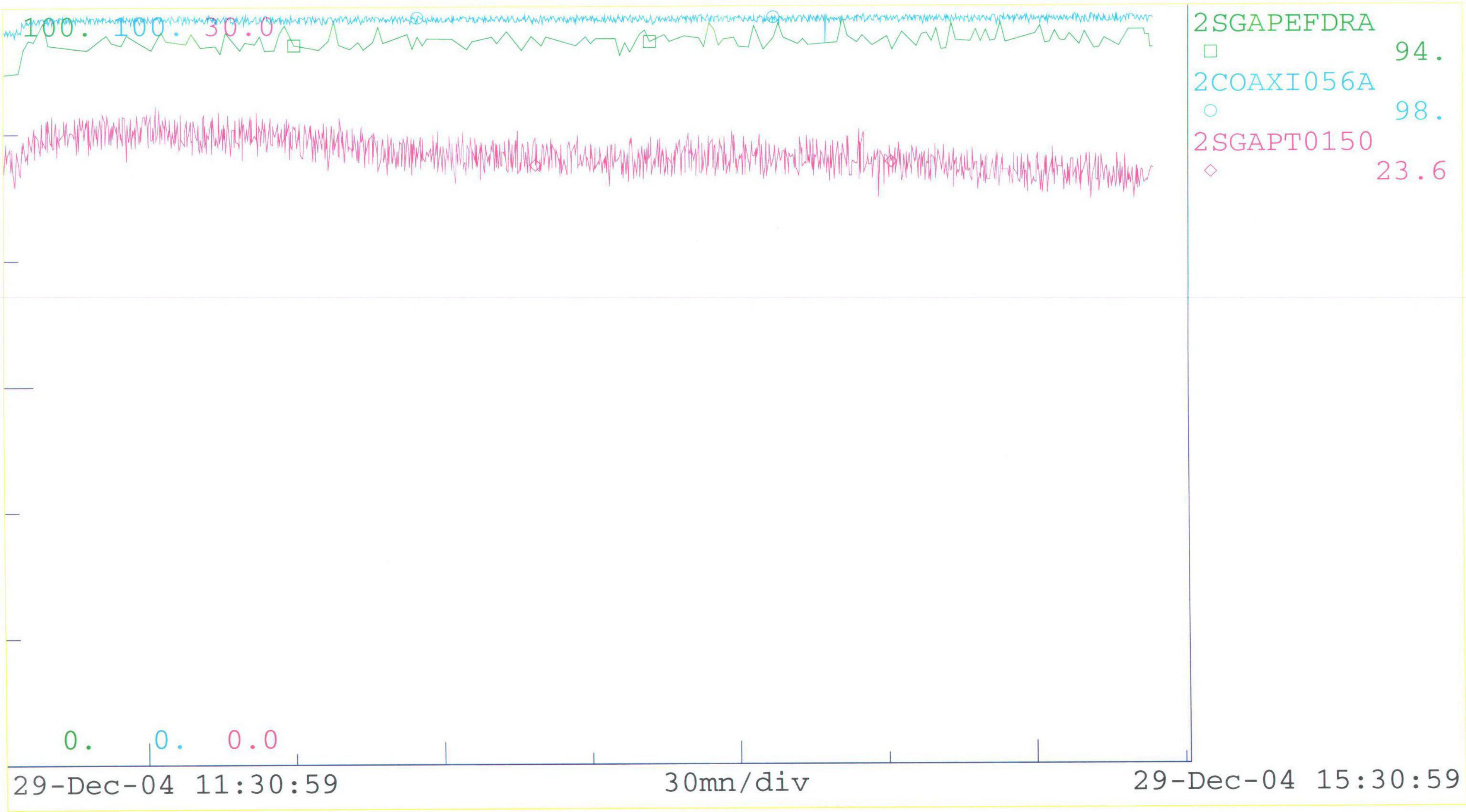
EndTim= 29-Dec-04 15:23:46 /EvalTim= 29-Dec-04 15:23:46 /PanRate= 0

IP12_002852

A nill

Printed out for: UNIT2OP - 29-Dec-04 15:23:55

0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 15:23:55



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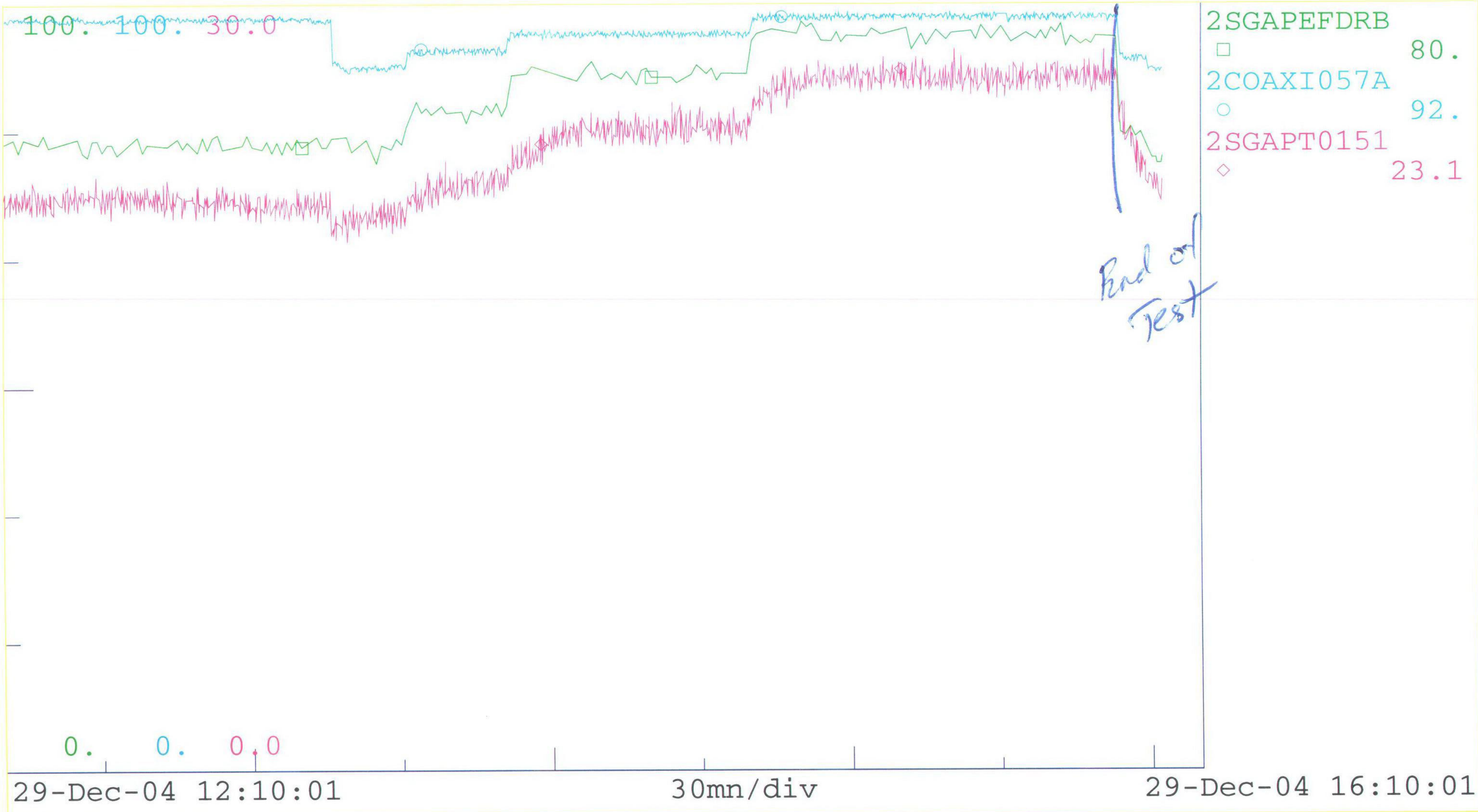
B Rill

Printed out for: UNIT2OP - 29-Dec-04 16:02:30

0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 16:02:30



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A Mill

Printed out for: UNIT2OP - 29-Dec-04 16:02:48

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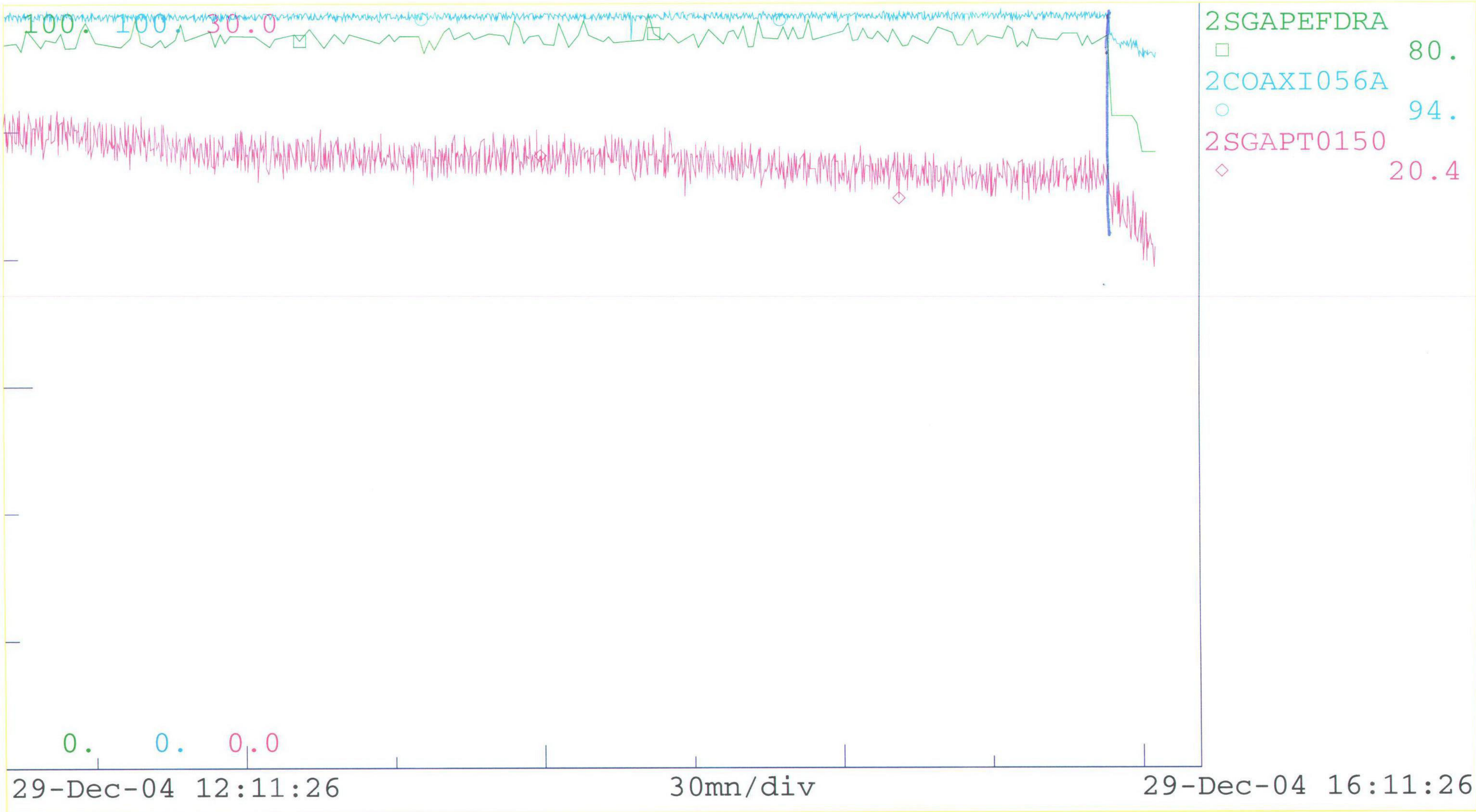

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2A vs 2B   A 95%
B 90%

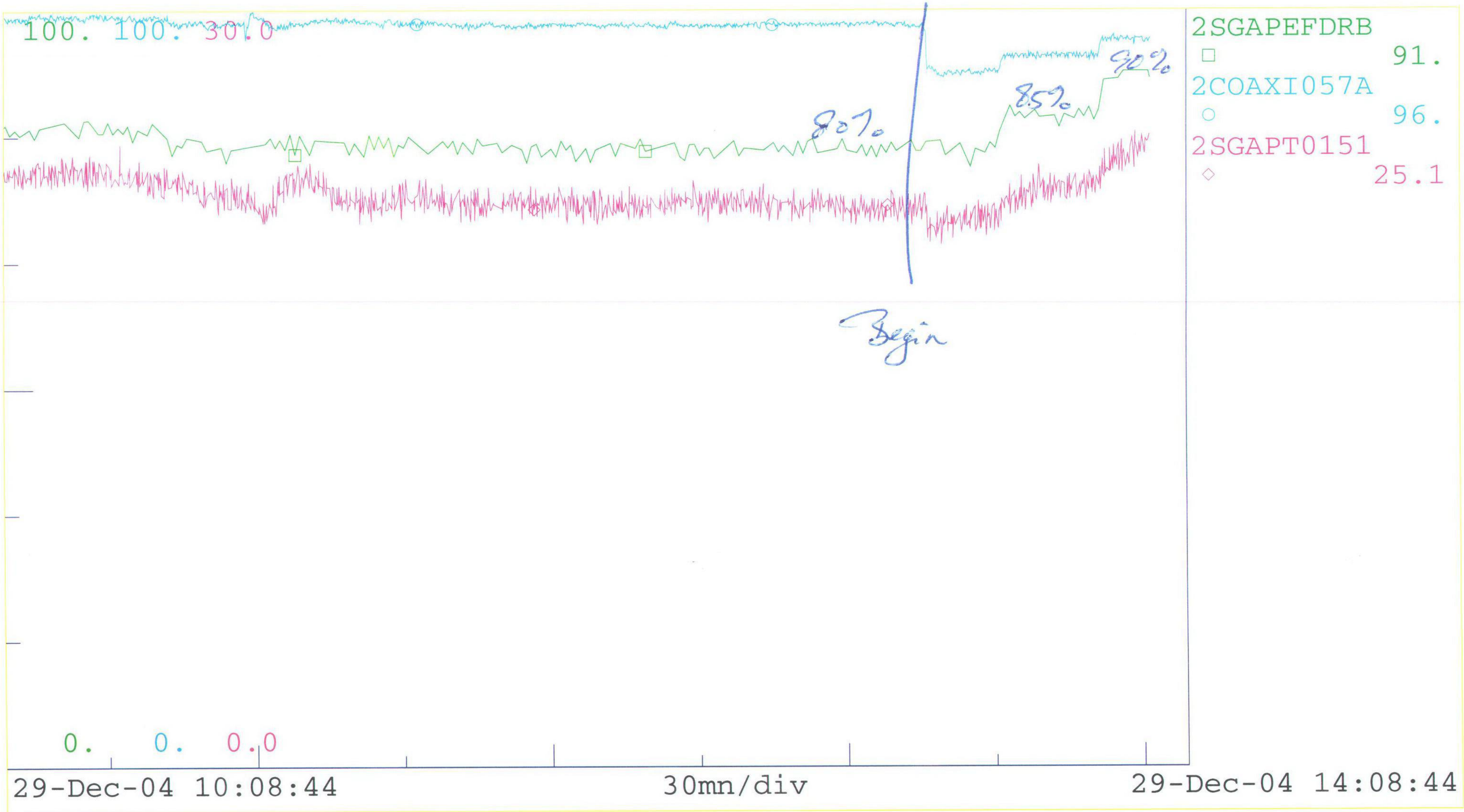
Printed out for: UNIT2OP - 29-Dec-04 14:01:30
0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 14:01:30

Unit 2 944.3 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow392.5TPH	65.3	62.4	53.4	53.7	54.5	BadI	53.9	53.7
Feeder Speed	94.7	91.0	79.1	79.2	80.7	Calc	79.1	78.3
Amps(Duct Pr56.8)	67.2	70.7	64.6	68.5	75.7	0.0	62.5	72.4
Coal Pipe Vel	4823.	4737.	4775.	4888.	4930.	6.	4887.	4902.
PA Flow %	98.3	96.3	99.6	100.	100.	0.1	100.	100.
PA Damper Pos	88.2	71.4	74.1	76.6	79.7	0.0	100.	80.9
SA Damper Pos	91.8	88.1	73.6	78.5	79.0	28.0	74.6	74.3
PA Mass Flow	3900.	3786.	3941.	3955.	3955.	5.	3955.	3955.
Pulv DP(NOx 0.32)	24.9	25.0	18.5	20.4	24.9	0.0	22.1	20.0
Air to Fuel Ratio	1.81	1.84	2.16	2.20	2.16	Calc	2.19	2.23
Pulv Inlet Temp	427.1	443.6	449.7	366.0	376.2	102.1	341.2	385.0
Pulv Outlet Temp	140.4	145.2	138.7	139.6	144.8	103.5	139.5	141.3
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	0.0	0.0
Air Bias	0.0	0.0	10.0	10.1	9.9	0.0	15.0	10.1
Hyd Skid Pr Fdbk	2302.	2411.	2465.	2298.	1879.	748.	2464.	2026.
Hyd Skid Pr Setpt	2400.	2400.	2365.	2377.	2399.	1149.	2382.	2374.

EndTim= 29-Dec-04 14:01:30 /EvalTim= 29-Dec-04 14:01:30 /PanRate= 0

B Mill 90%

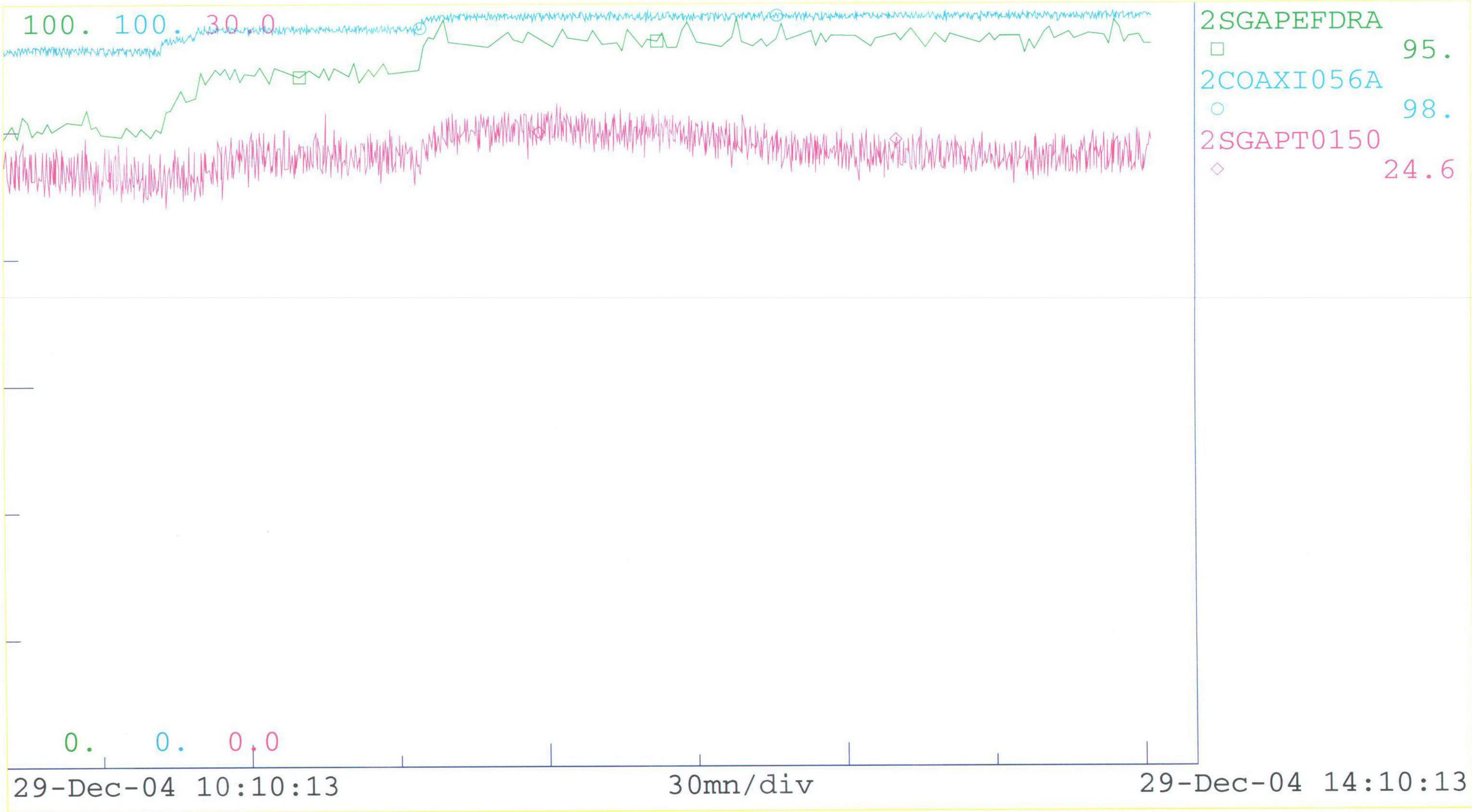
Printed out for: UNIT2OP - 29-Dec-04 14:01:35
0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 14:01:35



EndTim= 29-Dec-04 14:01:35 /EvalTim= 29-Dec-04 14:01:35 /PanRate= 0

A Mill 95%

Printed out for: UNIT2OP - 29-Dec-04 14:01:49
0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 14:01:49



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IP12_002858

Printed out for: UNIT2OP - 29-Dec-04 13:40:42 2A vs 2B A 95% B 85%

0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 13:40:42

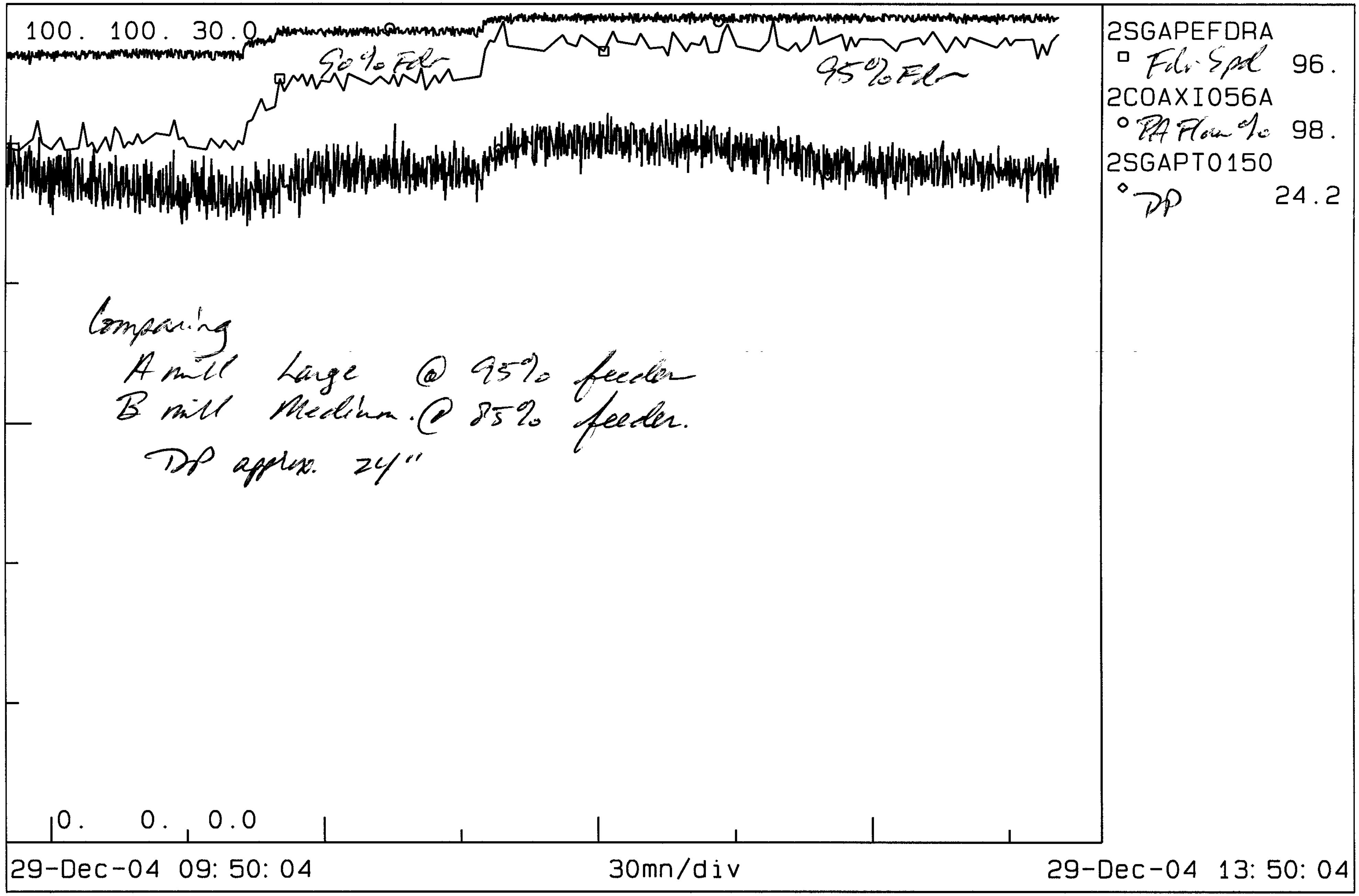
Unit 2 942.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow392.5TPH	64.2	58.3	54.7	54.3	54.8	BadI	55.0	54.5
Feeder Speed	96.4	85.8	80.1	80.1	80.8	Calc	80.3	79.8
Amps (Duct Pr57.2)	66.1	67.8	65.0	69.4	78.9	0.0	63.7	74.8
Coal Pipe Vel	4826.	4629.	4866.	4900.	4912.	6.	4896.	4911.
PA Flow %	98.4	93.7	99.7	100.	100.	0.1	100.	100.
(Duct Pr PA Damper Pos	87.7	68.8	71.8	82.2	80.6	0.0	100.	82.1
SA Damper Pos	90.5	82.3	76.4	81.2	81.3	28.0	$\boxed{77.3}$	77.1
PA Mass Flow	3880.	3718.	3935.	3955.	3955.	5.	3955.	3955.
Pulv DP (NOx 0.30)	24.2	23.0	17.4	21.4	25.0	0.0	23.1	21.6
Air to Fuel Ratio	1.78	1.90	2.17	2.18	2.16	Calc	2.17	2.20
Pulv Inlet Temp	428.4	449.6	358.8	373.6	375.3	102.1	355.7	397.4
Pulv Outlet Temp	141.2	146.4	140.1	140.6	142.4	104.1	140.4	142.3
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	0.0	0.0
Air Bias	0.0	0.0	10.0	10.1	9.9	0.0	15.0	10.1
Hyd Skid Pr Fdbk	2303.	2414.	2463.	2326.	1889.	745.	2464.	2016.
Hyd Skid Pr Setpt	2400.	2400.	2400.	2400.	2400.	1149.	2400.	2400.

EndTim= 29-Dec-04 13:40:42 /EvalTim= 29-Dec-04 13:40:42 /PanRate= 0

A mill

Printed out for: UNIT2OP - 29-Dec-04 13:40:47

0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 13:40:47



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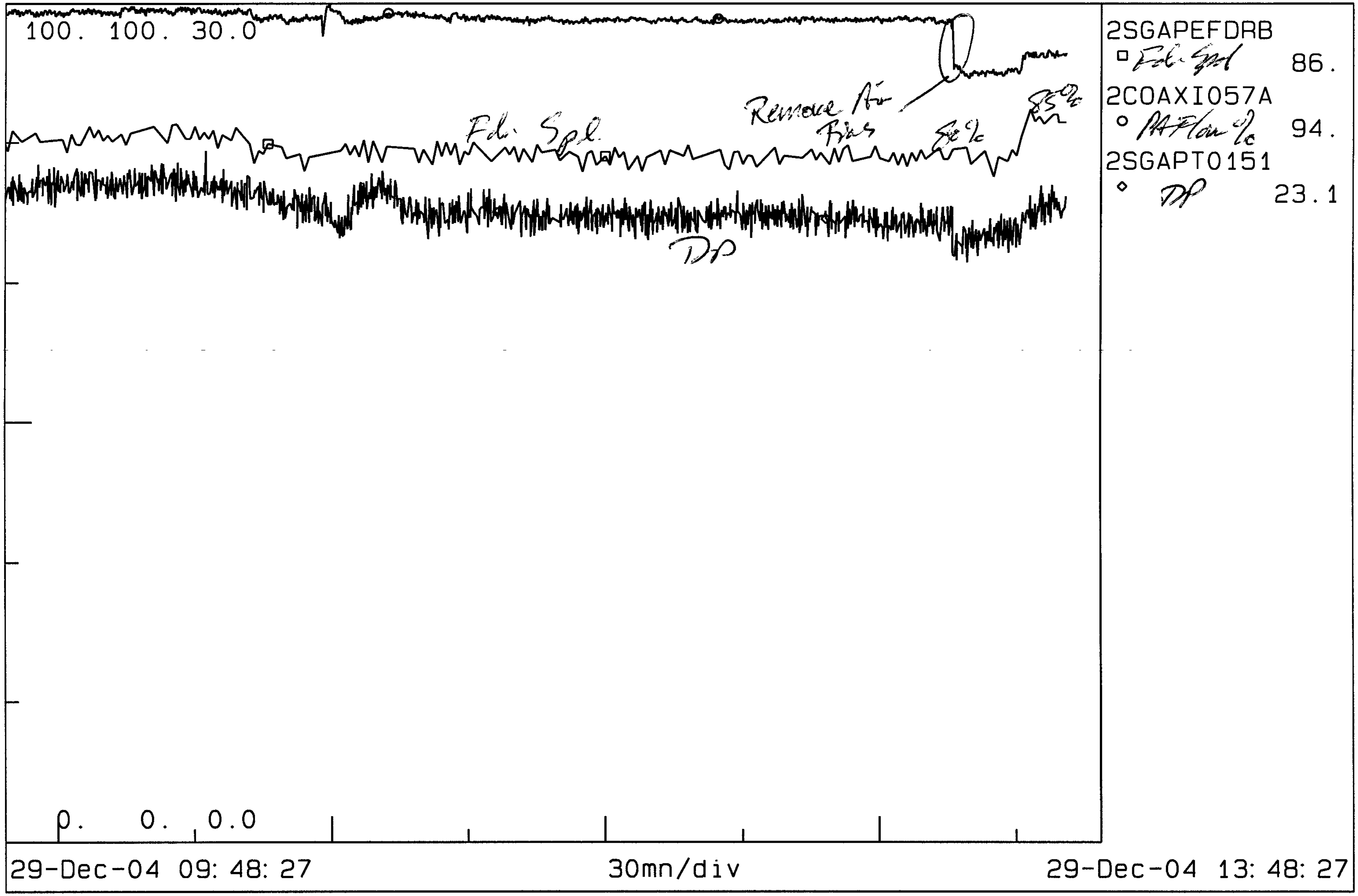
IP12_002860

Printed out for: UNIT2OP - 29-Dec-04 13: 40: 51 B Mill

0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 13: 40: 51



EndTim= 29-Dec-04 13: 40: 51 /EvalTim= 29-Dec-04 13: 40: 51 /PanRate= 0

IP12_002861

Printed out for: UNIT2OP - 29-Dec-04 10:58:43 B&W 2A Mill Test

0 Messages U2 Pulv U2 Pulv Operating data Pre-Test 29-Dec-04 10:58:43

Unit 2 936.5 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow 390.7TPH	62.4	56.1	56.3	55.9	54.0	BadI	56.8	55.9
Feeder Speed	89.9	82.4	82.4	81.8	79.6	Calc	82.5	82.2
Amps (Duct Pr56.7)	66.2	66.3	66.8	73.7	74.5	0.0	64.6	71.8
Coal Pipe Vel	4695.	4905.	4874.	4855.	4934.	6.	4869.	4844.
PA Flow %	96.7	97.8	99.9	100.	100.	0.1	100.	100.
PA Damper Pos (Duct Pr	85.7	72.3	72.5	82.8	79.8	0.0	100.	82.5
SA Damper Pos	87.4	78.5	78.3	82.4	80.4	28.0	78.5	78.3
PA Mass Flow	3826.	3801.	3951.	3955.	3955.	5.	3955.	3955.
Pulv DP (NOx 0.31)	23.8	22.3	18.4	24.0	25.2	0.0	23.4	20.1
Air to Fuel Ratio	1.87	2.08	2.12	2.13	2.20	Calc	2.11	2.12
Pulv Inlet Temp	413.3	426.6	323.0	341.2	359.6	102.4	348.9	365.9
Pulv Outlet Temp	139.5	153.8	140.9	138.1	147.3	108.7	138.8	136.2
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	0.0	0.0
Air Bias	0.0	6.2	10.0	10.1	9.9	0.0	15.0	10.1
Hyd Skid Pr Fdbk	2315.	2415.	2470.	2341.	1901.	748.	2463.	2010.
Hyd Skid Pr Setpt	2400.	2400.	2400.	2400.	2363.	1149.	2400.	2400.

EndTim= 29-Dec-04 10:58:43 /EvalTim= 29-Dec-04 10:58:43 /PanRate= 0

IP12_002862

Printed out for: UNIT2OP - 29-Dec-04 11:15:41 2A Mill B&W RR Throats 90%

0 Messages U2 Pulv U2 Pulv Operating data Beginning of Test 29-Dec-04 11:15:41

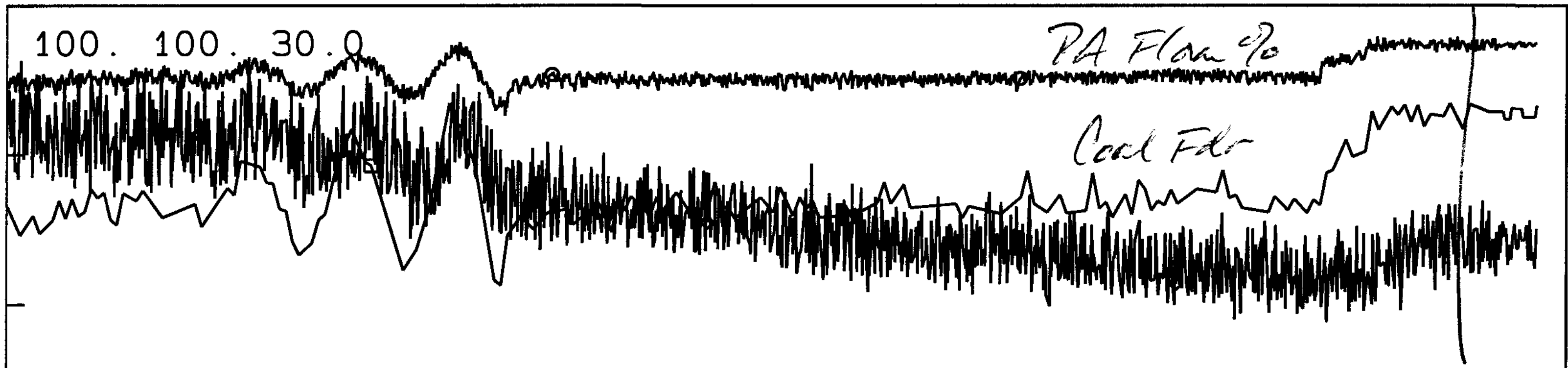
Unit 2 945.8 MW	Pulv A (B&W Throats)	Pulv B (Medium)	Pulv C	Pulv D	Pulv E (Medium)	Pulv F	Pulv G	Pulv H
Coal Flow392.5TPH	61.8	56.2	56.0	56.6	54.0	BadI	56.6	55.4
Feeder Speed	91.6	82.9	83.1	82.7	79.3	Calc	82.3	81.8
Amps (Duct Pr56.6)	66.4	68.1	64.6	72.6	75.2	0.0	64.6	75.2
Coal Pipe Vel	4719.	4892.	4875.	4875.	4881.	6.	4872.	4879.
PA Flow %	96.6	98.8	100.	100.	100.	0.1	100.	100.
PA Damper Pos (Duct Pr)	86.7	70.7	72.4	82.7	79.4	0.0	100.	83.4
SA Damper Pos	87.3	78.6	78.4	82.9	80.5	28.0	79.0	78.8
PA Mass Flow	3830.	3907.	3955.	3955.	3955.	5.	3955.	3955.
Pulv DP (NOx 0.30)	24.0	22.3	18.5	24.6	24.8	0.0	23.5	21.0
Air to Fuel Ratio	1.84	2.08	2.11	2.11	2.20	Calc	2.13	2.13
Pulv Inlet Temp	427.3	451.7	327.2	353.6	340.6	102.7	362.9	381.4
Pulv Outlet Temp	140.4	150.6	140.1	140.1	140.8	108.3	139.6	140.6
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	0.0	0.0
Air Bias	0.0	6.2	10.0	10.1	9.9	0.0	15.0	10.1
Hyd Skid Pr Fdbk	2316.	2411.	2470.	2344.	1903.	748.	2463.	2001.
Hyd Skid Pr Setpt	2400.	2400.	2400.	2400.	2393.	1149.	2400.	2400.

EndTim= 29-Dec-04 11:15:41 /EvalTim= 29-Dec-04 11:15:41 /PanRate= 0

Printed out for: UNIT2OP - 29-Dec-04 11: 15: 31 2A Mill B&W RR Throats 30%

0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 11: 15: 31

100. 100. 30.0



2SGAPEFDRA
□ Fdr Spd 92.

2COAXI056A
○ PA Flow % 97.

2SGAPT0150
◇ DP 24.4

Beginning of Test

Nearly 400 TPH Coal

Very High PA Duct Press. 56.6".

High moisture coal (Wyoming)

Reduced Pulv Outlet Temp 140° (Normally 150°F)

Pulv Inlet Temp 430° Very High

7 mills

11:30 AM

Al Williams, Keith Mangrum

Could not test 2B nor 2E (B&W "Medium" Port), because of high capacity and concern for loading up.

0. 0. 0.0

29-Dec-04 07: 19: 50 30mn/div 29-Dec-04 11: 19: 50

EndTim= 29-Dec-04 11: 15: 31 /EvalTim= 29-Dec-04 11: 15: 31 /PanRate= 0

IP12_002864

Printed out for: UNIT2OP - 29-Dec-04 12:10:00 2A Mill B&W PR Throats 95%

0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 12:10:00

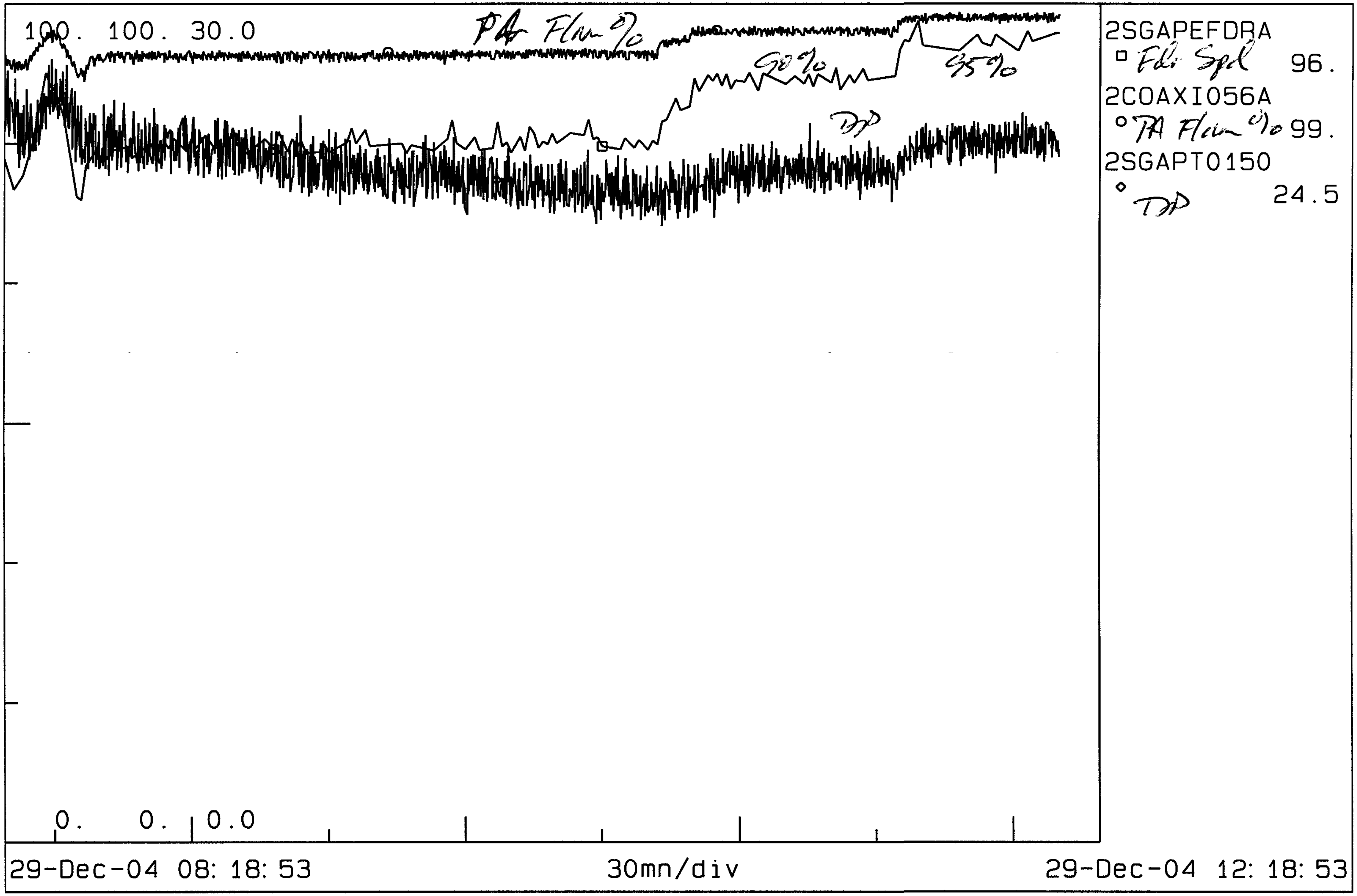
Unit 2 942.5 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow 392.6TPH	64.2	55.6	55.0	54.9	54.0	BadI	55.5	55.0
Feeder Speed	96.5	81.6	82.0	81.2	78.8	Calc	81.5	80.7
Amps (Duct Pr57.3)	66.7	67.9	64.0	72.2	74.7	0.0	66.4	72.8
Coal Pipe Vel	4828.	4831.	4877.	4886.	4851.	6.	4880.	4891.
PA Flow %	98.5	97.8	99.8	100.	100.	0.1	100.	100.
PA Damper Pos (Duct Pr	88.7	69.3	71.9	82.5	80.5	0.0	100.	82.2
SA Damper Pos	91.0	77.7	77.6	82.0	80.7	28.0	78.1	77.8
PA Mass Flow	3892.	3881.	3955.	3955.	3955.	5.	3955.	3955.
Pulv DP (NOx 0.30)	24.9	22.1	18.4	22.8	25.7	0.0	23.0	20.0
Air to Fuel Ratio	1.79	2.10	2.12	2.14	2.21	Calc	2.15	2.16
Pulv Inlet Temp	445.0	424.6	347.5	371.5	344.0	102.1	356.6	397.9
Pulv Outlet Temp	140.3	145.6	140.1	140.3	136.0	106.2	139.5	140.9
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	0.0	0.0
Air Bias	0.0	6.2	10.0	10.1	9.9	0.0	15.0	10.1
Hyd Skid Pr Fdbk	2317.	2421.	2463.	2337.	1906.	748.	2463.	2025.
Hyd Skid Pr Setpt	2400.	2400.	2400.	2400.	2388.	1149.	2400.	2400.

EndTim= 29-Dec-04 12:10:00 /EvalTim= 29-Dec-04 12:10:00 /PanRate= 0

IP12_002865

Printed out for: UNIT2OP - 29-Dec-04 12:10:09

0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 12:10:09

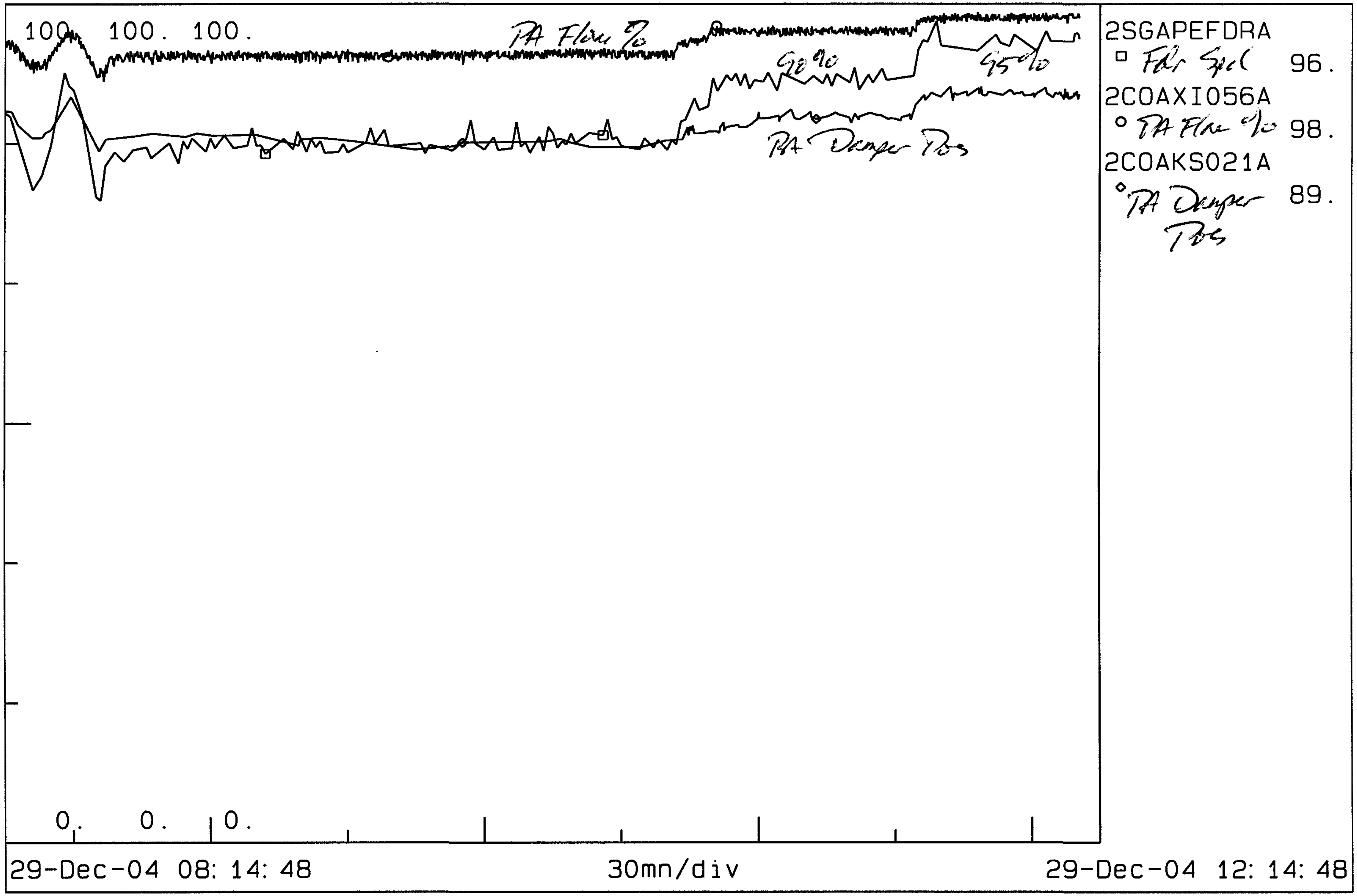


EndTim= 29-Dec-04 12:10:09 /EvalTim= 29-Dec-04 12:10:09 /PanRate= 0

IP12_002866

Printed out for: UNIT2OP - 29-Dec-04 12:10:18

0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 12:10:18



EndTim= 29-Dec-04 12:10:18 /EvalTim= 29-Dec-04 12:10:18 /PanRate= 0

IP12_002867

Printed out for: UNIT2OP - 29-Dec-04 13:02:20 2A Mill B&W RR Throat 750

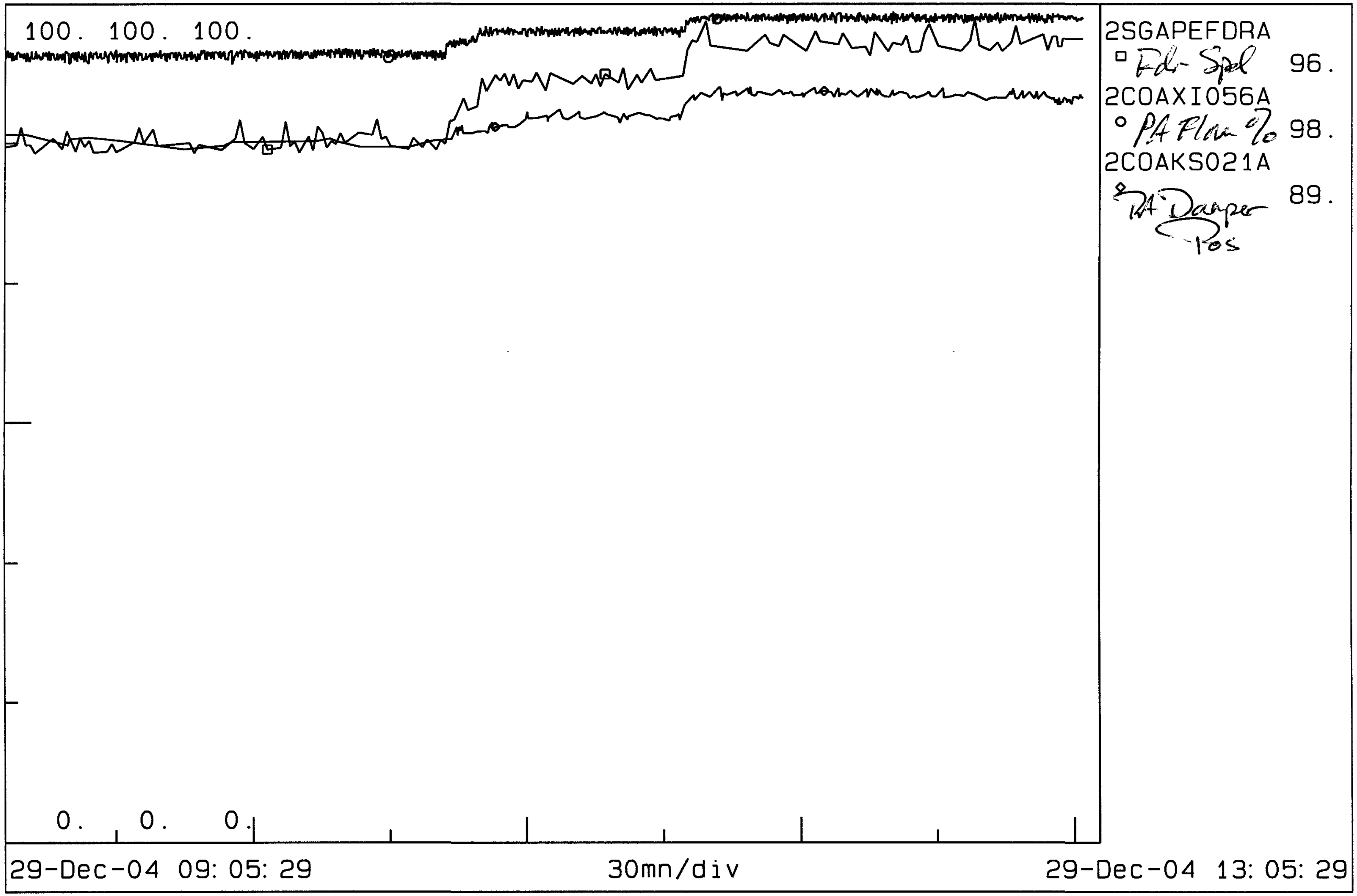
0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 13:02:20

Unit 2 921.5 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow392.6TPH	65.0	54.4	55.5	55.4	53.7	BadI	55.4	54.9
Feeder Speed	95.8	81.4	81.4	80.9	79.1	Calc	81.5	80.9
Amps (Duct Pr57.1)	65.4	66.7	63.8	68.9	73.6	0.0	61.3	71.0
Coal Pipe Vel	4809.	4838.	4870.	4890.	4875.	6.	4770.	4893.
PA Flow %	98.6	98.2	100.	100.	100.	0.1	100.	100.
PA Damper Pos (Duct Pr	89.1	69.4	72.1	82.7	80.6	0.0	100.	82.3
SA Damper Pos	92.6	77.8	77.5	81.4	79.5	28.0	$\boxed{77.9}$	77.8
PA Mass Flow	3890.	3880.	3950.	3955.	3955.	5.	3955.	3955.
Pulv DP (NOx 0.30)	24.7	22.3	17.9	22.5	25.0	0.0	24.8	20.2
Air to Fuel Ratio	1.79	2.11	2.12	2.16	2.19	Calc	2.15	2.15
Pulv Inlet Temp	453.8	432.8	371.8	371.8	368.1	102.4	411.7	396.3
Pulv Outlet Temp	142.0	146.9	140.9	140.6	138.7	104.8	125.3	140.9
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	0.0	0.0
Air Bias	0.0	6.2	10.0	10.1	9.9	0.0	15.0	10.1
Hyd Skid Pr Fdbk	2302.	2411.	2464.	2333.	1910.	750.	2463.	2025.
Hyd Skid Pr Setpt	2400.	2400.	2400.	2400.	2400.	1149.	2400.	2400.

EndTim= 29-Dec-04 13:02:20 /EvalTim= 29-Dec-04 13:02:20 /PanRate= 0

Printed out for: UNIT2OP - 29-Dec-04 13:02:00

0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 13:02:00



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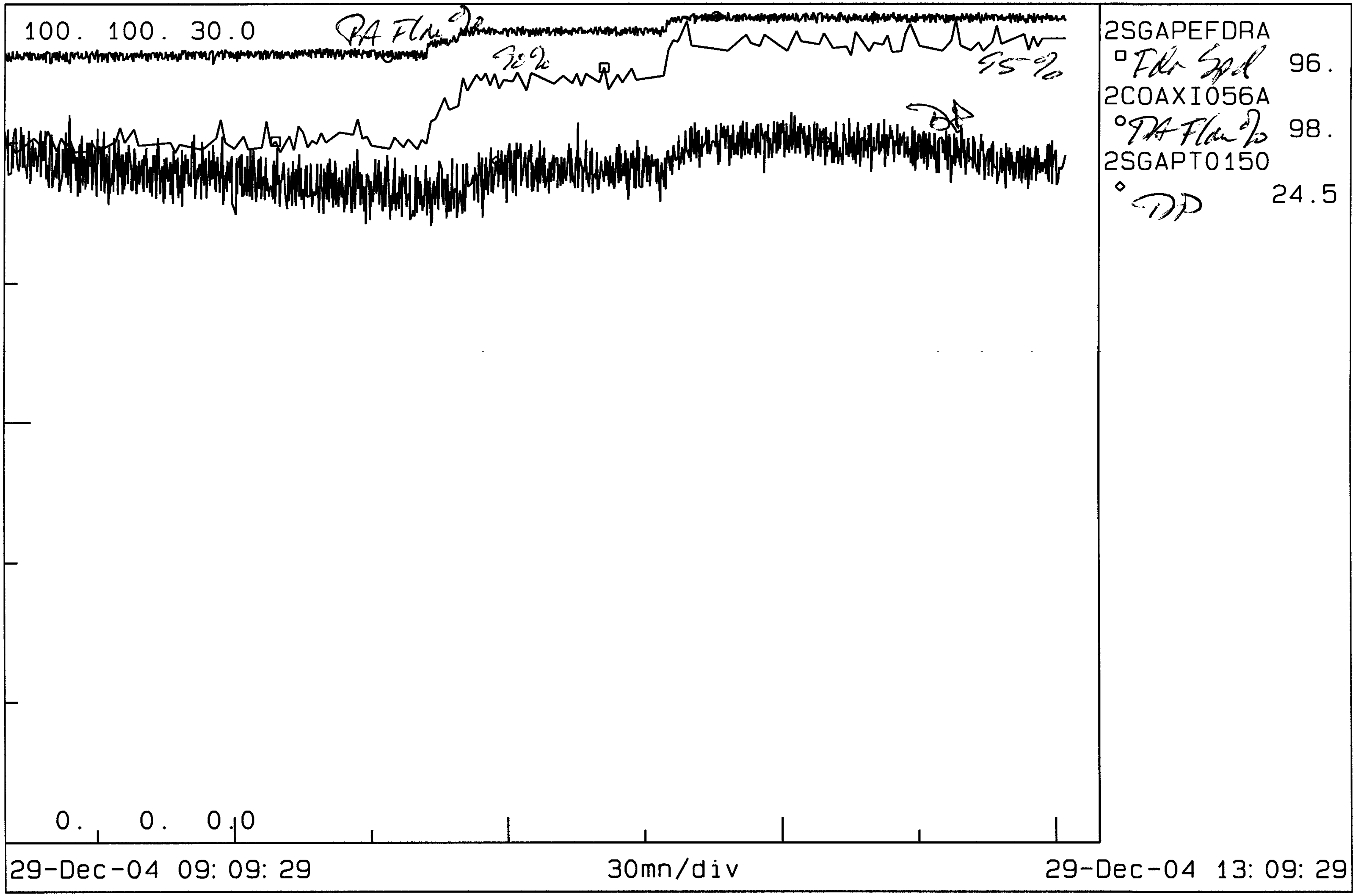
IP12_002869

Printed out for: UNIT2OP - 29-Dec-04 13:02:10
0 Messages U2 Pulv U2 Pulv Operating data 29-Dec-04 13:02:10



EndTim= 29-Dec-04 13:02:10 /EvalTim= 29-Dec-04 13:02:10 /PanRate= 0

IP12_002870

Printed out for: PHIL-H - 28-Dec-04 08:38:04

0 Messages U2 Pulv U2 Pulv Operating data 28-Dec-04 08:38:04

Unit 2 953.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow396.9TPH	55.0	50.7	46.8	50.1	50.0	41.6	50.6	49.3
Feeder Speed	82.7	75.1	70.0	74.1	74.1	61.3	74.8	73.1
Amps (Duct Pr55.5)	62.0	65.1	64.7	65.4	80.1	60.0	63.9	67.6
Coal Pipe Vel	4516.	4537.	4575.	4801.	4701.	4597.	4763.	4774.
PA Flow %	93.3	92.5	95.0	98.5	97.1	95.1	99.9	98.3
(Duct Pr PA Damper Pos	79.1	64.3	68.1	75.2	73.5	66.5	74.7	74.9
SA Damper Pos	78.2	68.0	62.4	71.0	72.5	57.8	68.2	68.0
PA Mass Flow	3702.	3684.	3773.	3954.	3860.	3778.	3953.	3911.
Pulv DP (NOx 0.32)	19.2	19.5	15.0	17.0	21.0	18.5	19.8	13.2
Air to Fuel Ratio	1.99	2.19	2.38	2.36	2.31	2.73	2.33	2.37
Pulv Inlet Temp	372.5	364.8	340.4	342.5	317.2	350.2	349.2	357.9
Pulv Outlet Temp	140.6	144.8	140.9	140.4	139.3	139.1	136.4	140.6
Coal Bias	8.0	0.0	-8.0	0.0	0.0	-12.	0.0	0.0
Air Bias	0.0	4.4	10.0	10.1	8.1	12.0	12.1	10.1
Hyd Skid Pr Fdbk	2305.	2220.	2272.	2173.	1882.	1905.	2322.	1033.
Hyd Skid Pr Setpt	2400.	2241.	2122.	2236.	2241.	1930.	2261.	2210.

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IP12_002871

Printed out for: JERRY-F - 28-Dec-04 08:17:26

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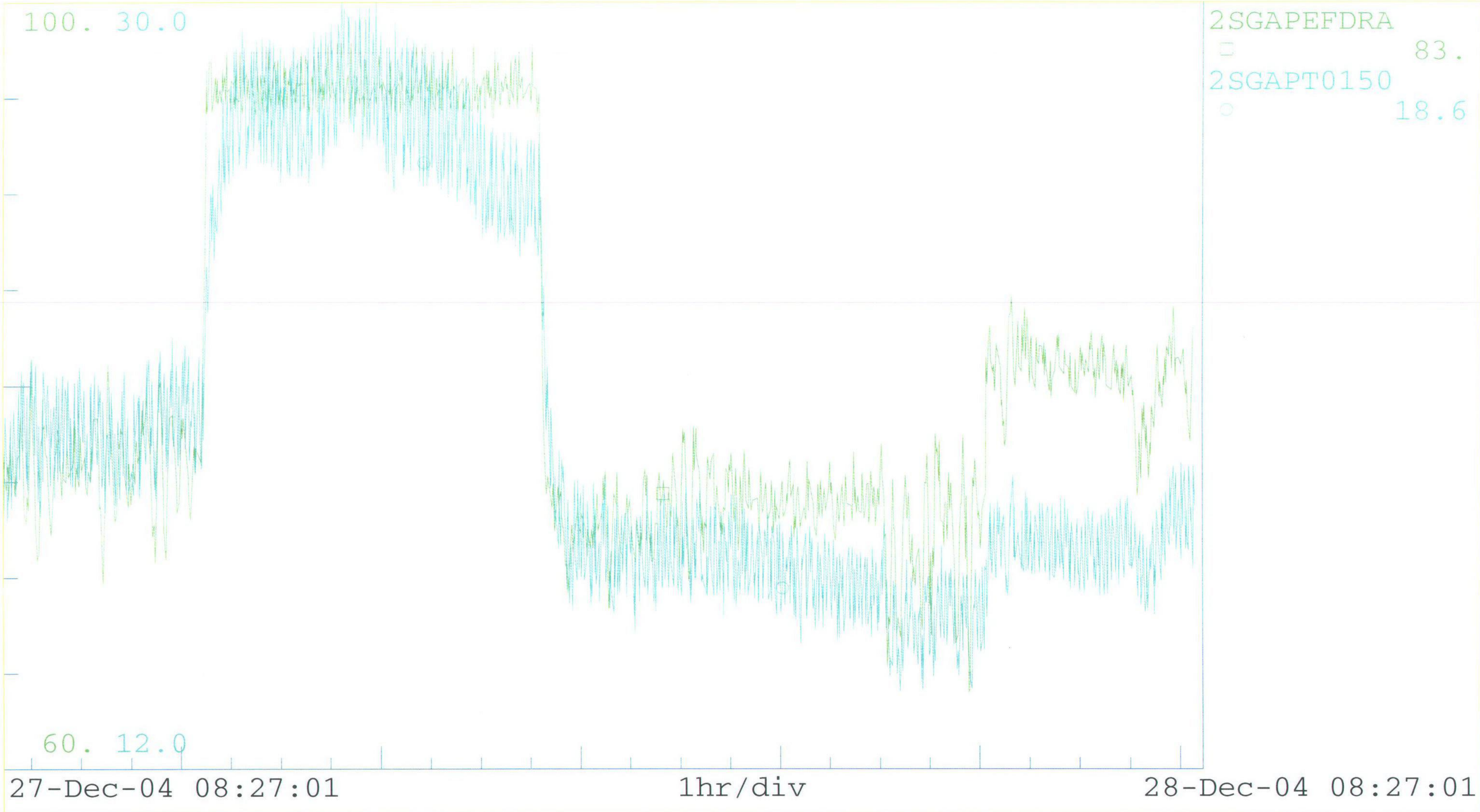

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IP12_002872

Printed out for: UNIT2OP - 25-Aug-04 16:13:09 B&W Rotating Throat E mill

0 Messages U2 Pulv U2 Pulv Operating data 25-Aug-04 16:13:09

Unit 2 952.5MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow377.9TPH	52.6	0.1	53.3	52.9	64.6	53.3	50.7	52.4
Feeder Speed	76.7	0.1	78.5	77.6	95.1	78.2	74.8	77.0
Amps (Duct Pr49.5)	64.8	0.0	64.0	71.8	67.9	68.5	68.0	74.2
Coal Pipe Vel	4095.	3.	4345.	4257.	3989.	4027.	4235.	4373.
PA Flow %	92.2	0.1	98.2	95.5	89.3	90.5	95.7	98.2
PA Damper Pos (Duct Pr	80.6	1.4	80.9	78.4	100.	68.2	69.6	89.7
SA Damper Pos	74.3	23.0	73.4	78.3	95.3	78.6	69.2	74.2
PA Mass Flow	3640.	3.	3861.	3771.	3545.	3565.	3780.	3876.
Pulv DP (NOx 0.45)	17.8	2.8	20.2	17.0	27.3	16.8	11.6	21.3
Air to Fuel Ratio	2.08	1.31	2.19	2.14	1.65	2.02	2.22	2.21
Pulv Inlet Temp	315.5	120.3	307.3	315.3	356.4	350.8	309.0	374.8
Pulv Outlet Temp	149.9	94.8	150.9	150.1	152.3	150.1	150.1	150.8
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	-4.0	0.0
Air Bias	0.0	0.0	9.1	4.2	0.0	0.0	6.1	7.8
Hyd Skid Pr Fdbk	2188.	4.	2356.	2204.	2291.	2329.	2366.	1405.
Hyd Skid Pr Setpt	2334.	1149.	2358.	2346.	2400.	2369.	2265.	2341.

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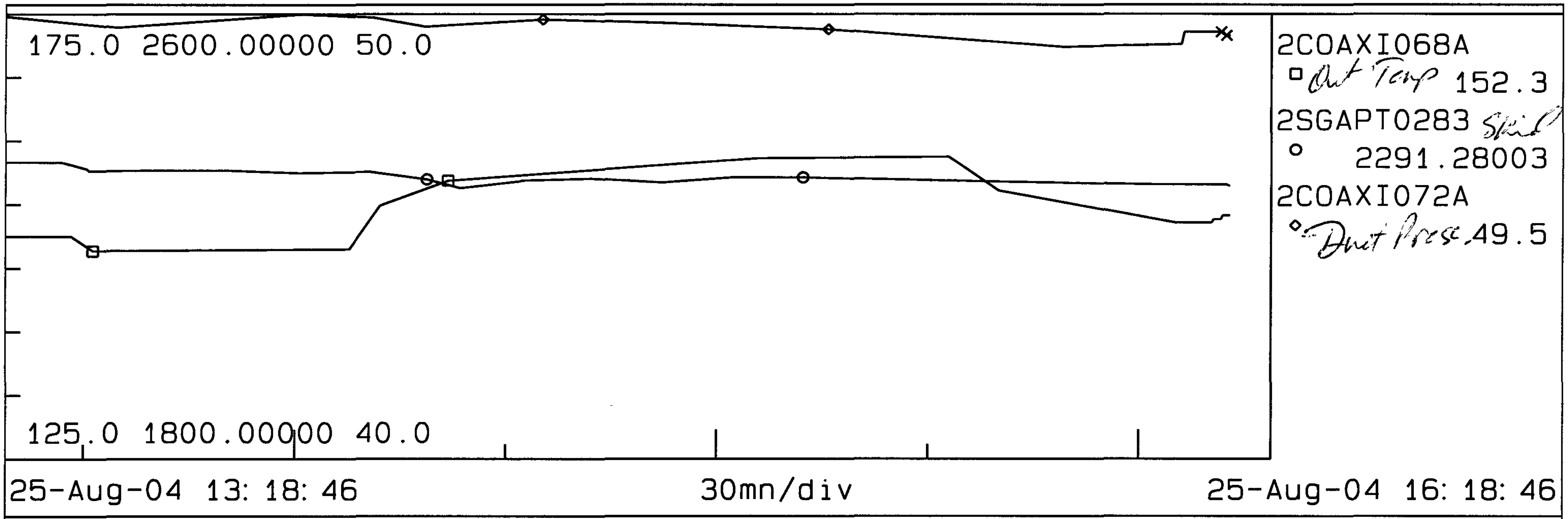
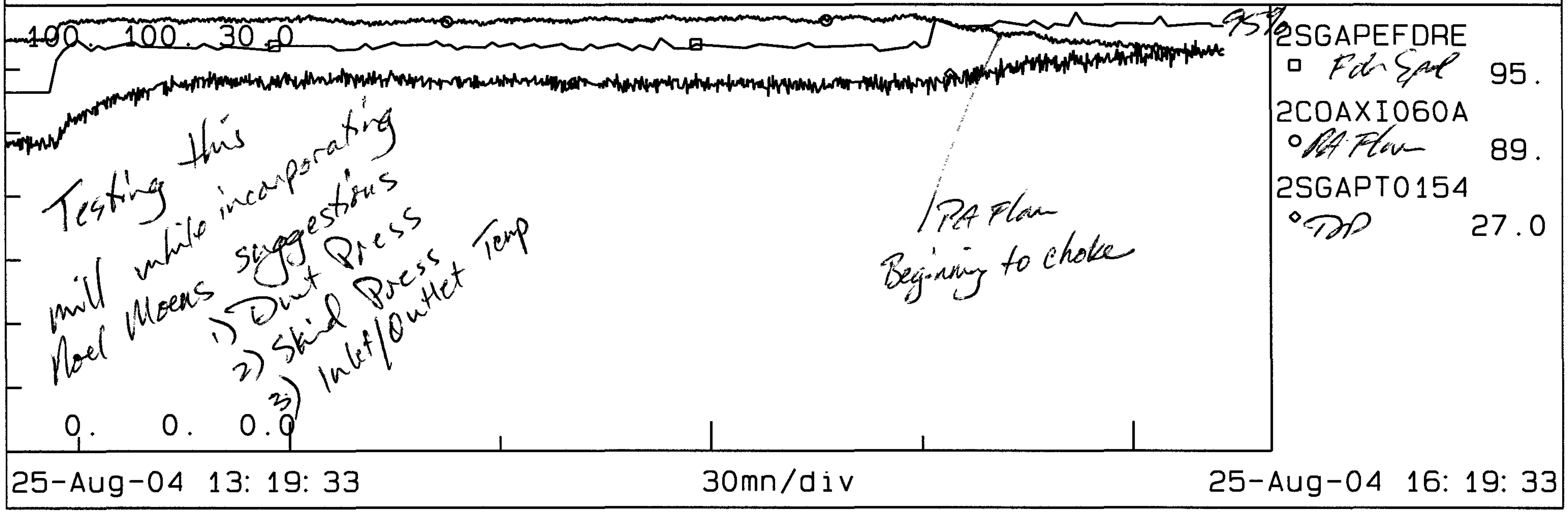
Printed out for: UNIT2OP - 25-Aug-04 16:13:00

0 Messages U2 Pulv U2 Pulv Operating data 2E Mill 25-Aug-04 16:13:00





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IP12_002874

[redacted]nted out for: UNIT2OP - 25-Aug-04 15: 30: 32

0 Messages U2 Pulv U2 Pulv Operating data B&W 25-Aug-04 15: 30: 32

Unit 2 951.3 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow375.2TPH	52.4	0.1	53.3	52.9	61.6	53.8	50.3	52.2
Feeder Speed	76.2	0.1	77.7	77.0	90.3	77.8	73.8	75.8
Amps (Duct Pr49.6)	64.6	0.0	64.0	73.2	62.3	68.6	67.9	78.0
Coal Pipe Vel	4125.	1.	4356.	4251.	4398.	4033.	4263.	4416.
PA Flow %	92.1	0.0	98.0	94.9	96.9	90.4	95.3	98.5
PA Damper Pos (Duct Pr	80.6	1.4	79.5	77.3	94.8	67.6	69.3	86.6
SA Damper Pos	73.9	23.0	72.3	77.2	90.9	77.5	68.8	73.8
PA Mass Flow	3643.	1.	3855.	3767.	3835.	3559.	3766.	3854.
Pulv DP (NOx 0.45)	18.8	2.7	20.2	17.4	24.8	16.9	11.6	21.2
Air to Fuel Ratio	2.11	0.44	2.21	2.16	1.88	2.02	2.25	2.26
Pulv Inlet Temp	316.4	119.1	307.6	318.6	353.2	345.8	310.0	363.5
Pulv Outlet Temp	150.3	94.3	151.1	150.6	159.3	150.1	150.4	150.0
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	-4.0	0.0
Air Bias	0.0	0.0	9.1	4.2	0.0	0.0	6.1	7.8
Hyd Skid Pr Fdbk	2189.	4.	2357.	2209.	2300.	2329.	2386.	1412.
Hyd Skid Pr Setpt	2337.	1149.	2355.	2341.	2400.	2363.	2250.	2319.

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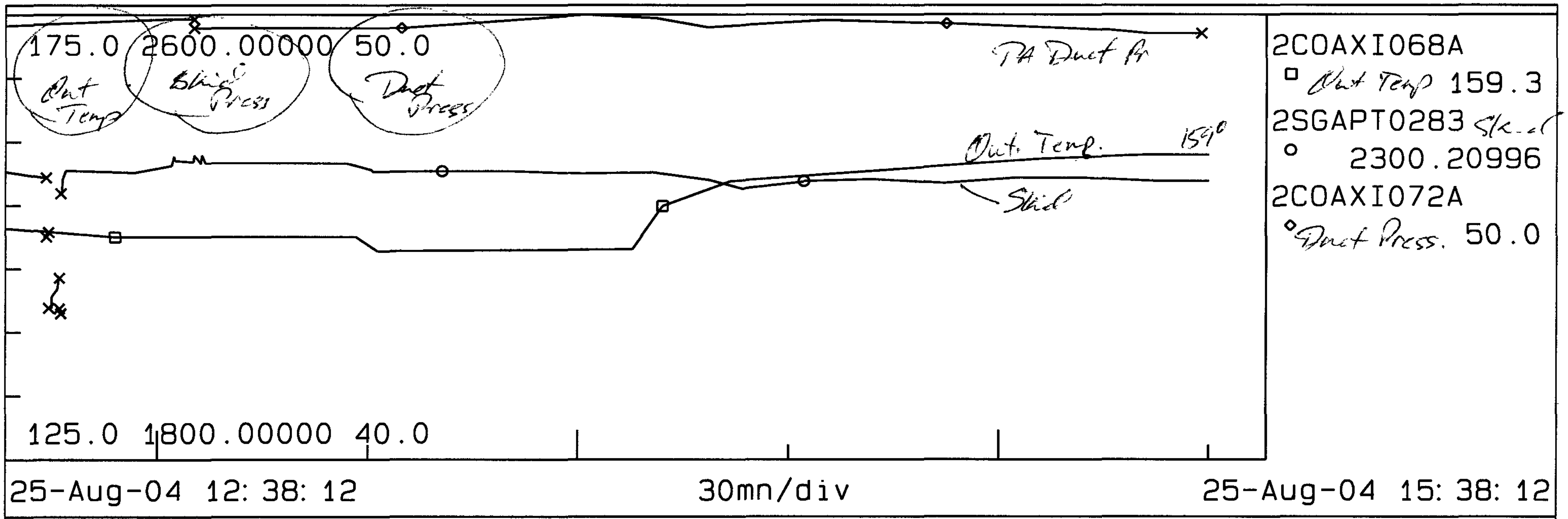
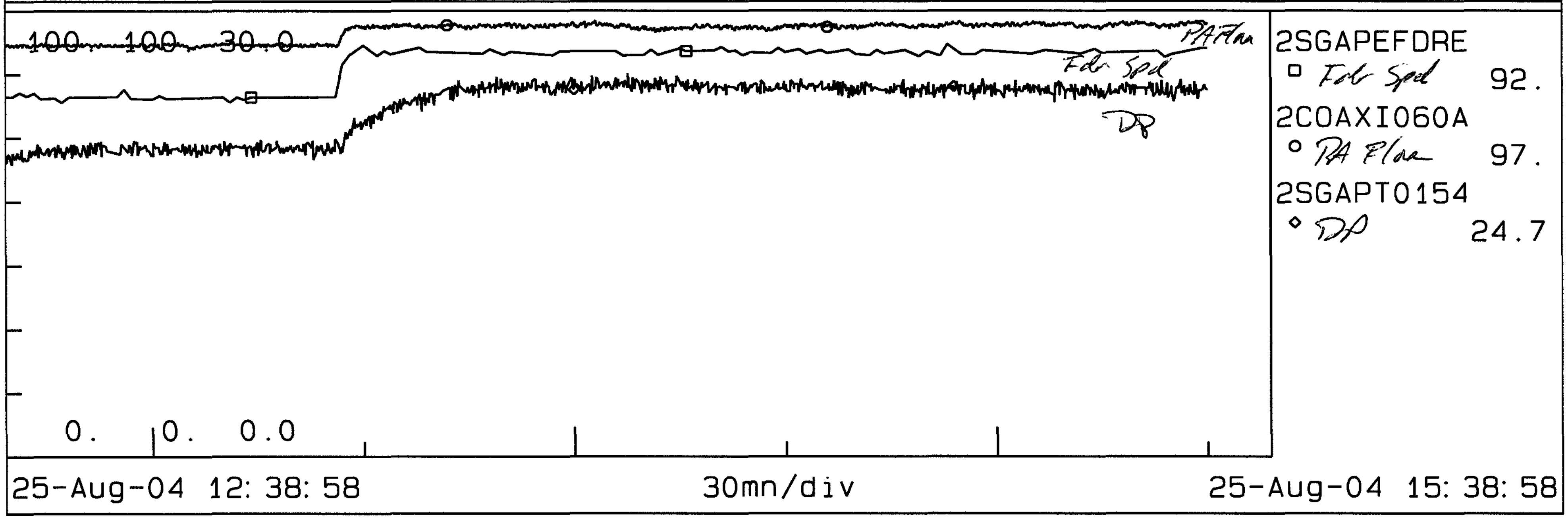
Printed out for: UNIT2OP - 25-Aug-04 15:30:12

0 Messages U2 Pulv U2 Pulv Operating data 25-Aug-04 15:30:12





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IP12_002876

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0 Messages U2 Pulv U2 Pulv Operating data 25-Aug-04 14:05:53

Unit 2 949.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow371.5TPH	52.0	0.1	53.1	52.8	61.9	52.6	50.3	52.9
Feeder Speed	75.5	0.1	77.2	79.3	90.9	76.7	73.5	76.4
Amps (Duct Pr49.7)	65.8	0.0	62.4	74.3	61.1	70.3	69.9	76.4
Coal Pipe Vel	4102.	1.	4351.	4197.	4300.	3999.	4227.	4302.
PA Flow %	91.8	0.0	96.7	94.5	96.6	90.0	95.3	97.8
PA Damper Pos (Duct Pr	80.8	1.4	80.6	76.6	98.0	68.3	69.3	92.1
SA Damper Pos	73.7	23.0	72.9	77.8	92.9	78.7	68.7	73.6
PA Mass Flow	3617.	1.	3856.	3731.	3818.	3546.	3750.	3849.
Pulv DP (NOx 0.43)	17.8	2.8	20.4	17.1	24.6	17.0	11.5	22.3
Air to Fuel Ratio	2.12	0.44	2.20	2.07	1.86	2.04	2.25	2.21
Pulv Inlet Temp	314.2	116.7	307.2	315.0	321.4	344.8	304.6	340.6
Pulv Outlet Temp	149.7	92.2	151.3	150.6	148.4	150.8	150.3	149.4
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	-4.0	0.0
Air Bias	0.0	0.0	9.1	4.2	0.0	0.0	6.1	7.8
Hyd Skid Pr Fdbk	2189.	4.	2357.	2192.	2314.	2330.	2400.	1430.
Hyd Skid Pr Setpt	2310.	1149.	2351.	2340.	2400.	2333.	2249.	2345.

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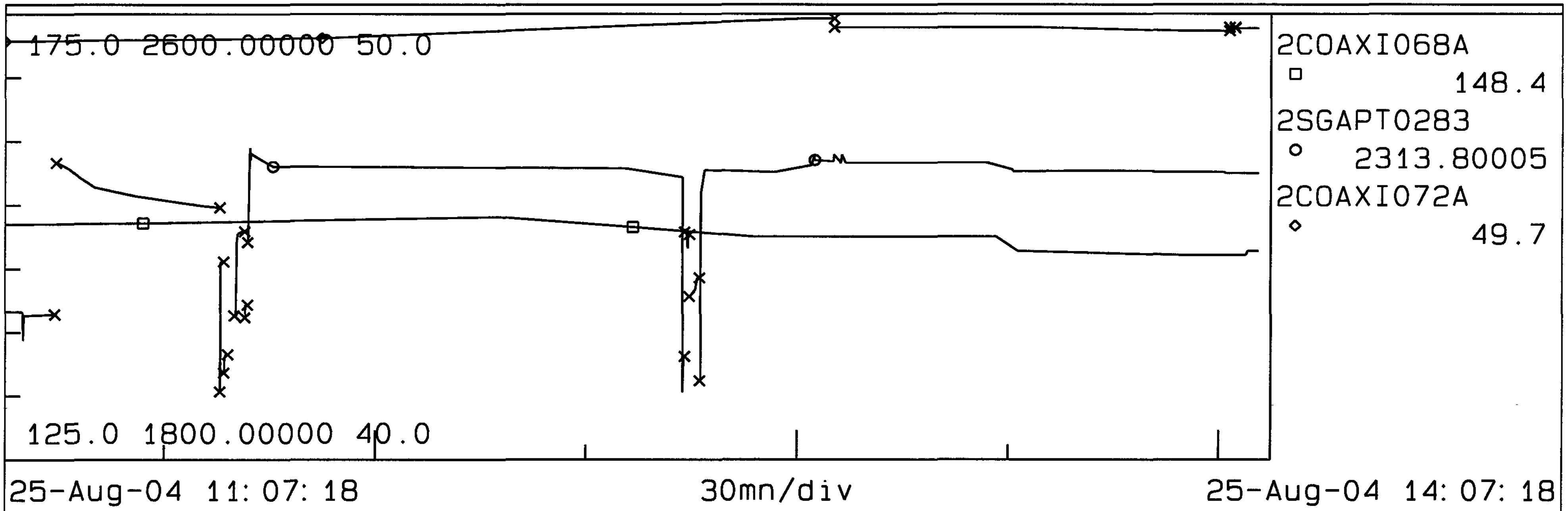

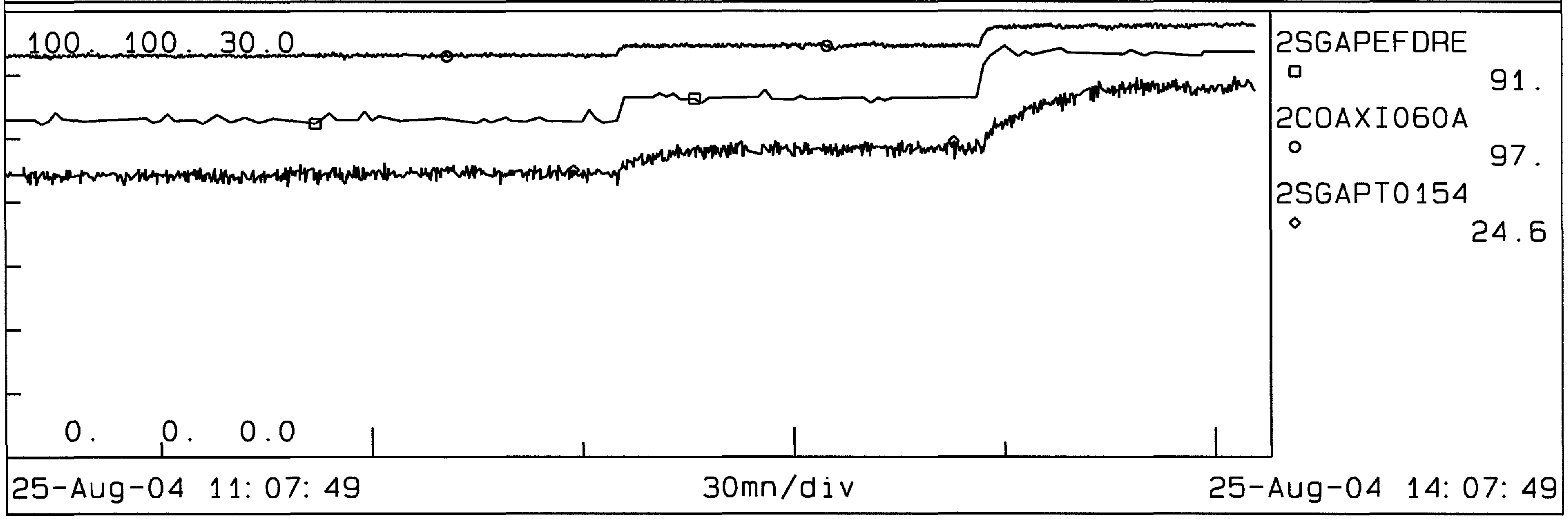

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IP12_002878

inted out for: UNIT2OP - 25-Aug-04 13:02:11
0 Messages U2 Pulv U2 Pulv Operating data B&W Rot. Throat 25-Aug-04 13:02:11

Unit 2 951.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow372.8TPH	54.1	0.1	54.5	54.0	54.7	54.7	52.1	54.4
Feeder Speed	79.1	0.1	79.6	80.6	80.9	79.7	76.7	79.7
Amps (Duct Pr49.7)	64.6	0.0	62.8	72.9	59.4	66.1	63.2	77.0
Coal Pipe Vel	4098.	1.	4400.	4219.	4112.	4010.	4253.	4358.
PA Flow %	92.9	0.1	98.4	95.3	92.1	91.2	96.4	98.7
PA Damper Pos (Duct Pr	82.4	1.4	83.3	79.4	78.2	69.5	70.5	90.8
SA Damper Pos	76.8	23.0	76.0	80.8	81.0	81.4	71.7	76.7
PA Mass Flow	3681.	3.	3911.	3748.	3638.	3615.	3790.	3910.
Pulv DP (NOx 0.43)	19.7	2.7	20.4	16.9	20.8	17.4	12.3	22.0
Air to Fuel Ratio	2.06	0.44	2.17	2.07	1.99	2.00	2.20	2.16
Pulv Inlet Temp	315.0	114.8	306.7	314.2	326.5	347.3	305.0	361.8
Pulv Outlet Temp	150.6	90.8	150.6	150.1	150.1	150.1	150.1	150.6
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	-4.0	0.0
Air Bias	0.0	0.0	9.1	4.2	0.0	0.0	6.1	7.8
Hyd Skid Pr Fdbk	2189.	4.	2357.	2256.	2316.	2334.	2365.	1427.
Hyd Skid Pr Setpt	2390.	1149.	2400.	2397.	2400.	2400.	2321.	2390.

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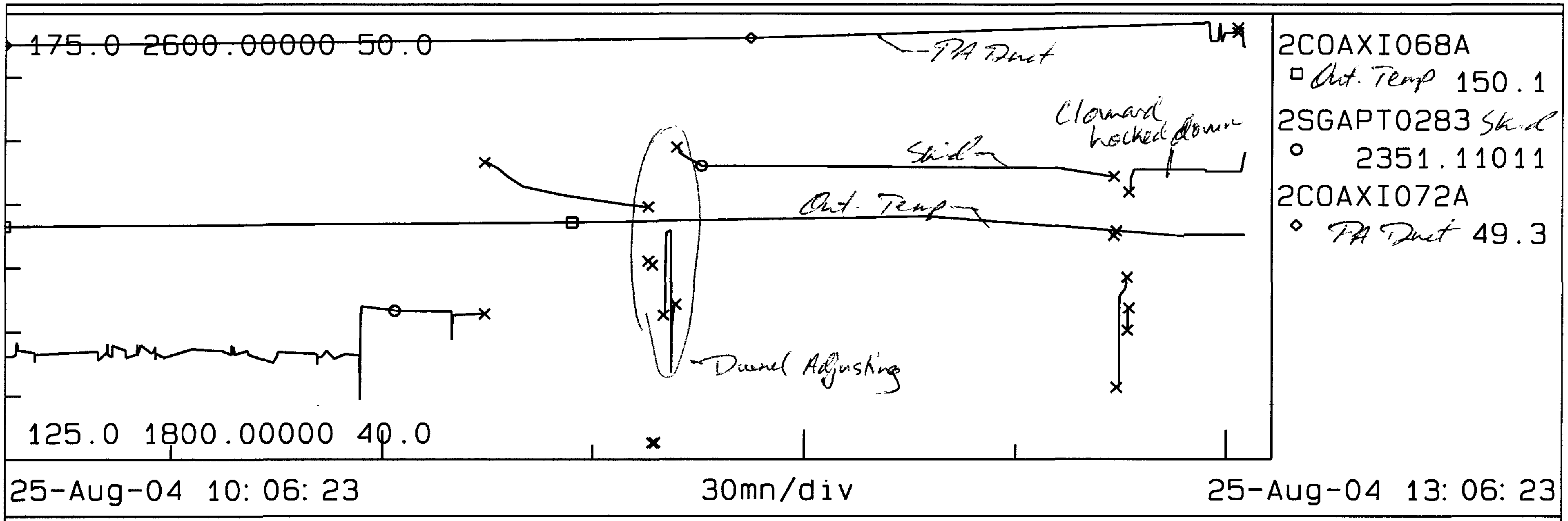
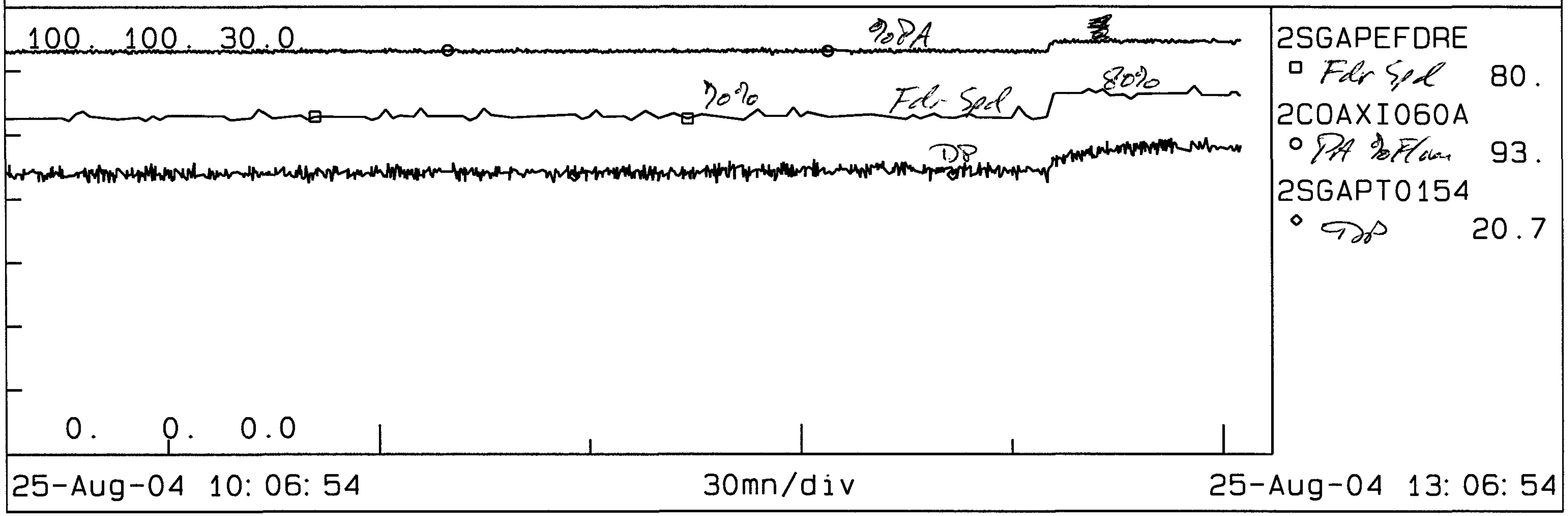
IP12_002879

[redacted]inted out for: UNIT2OP - 25-Aug-04 13:02:42 U2 E Mill Blw Throats

0 Messages U2 Pulv U2 Pulv Operating data 25-Aug-04 13:02:42





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IP12_002880

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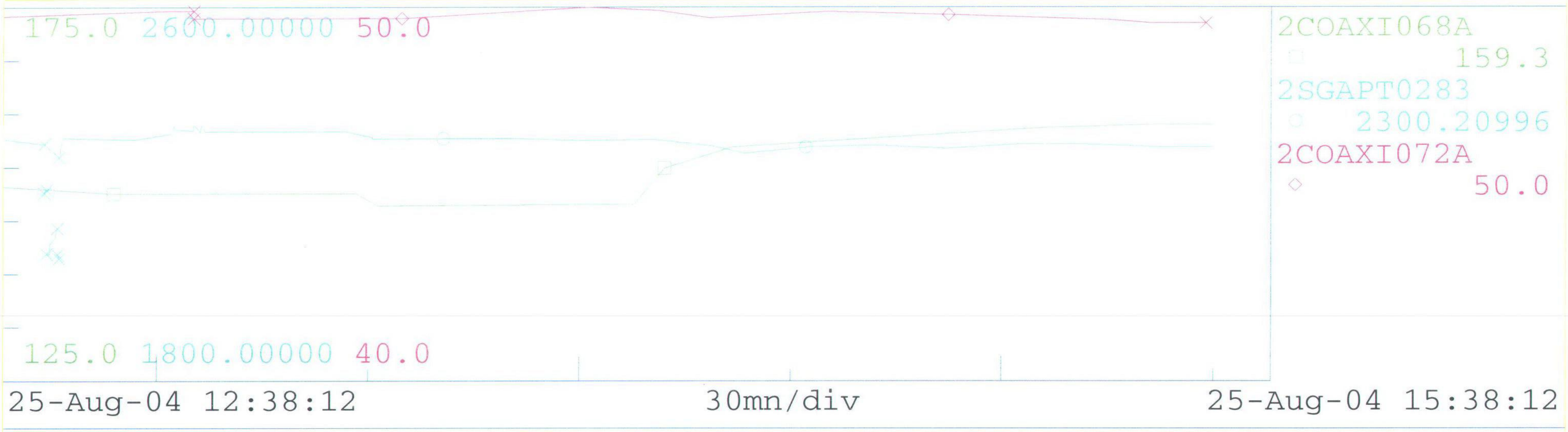

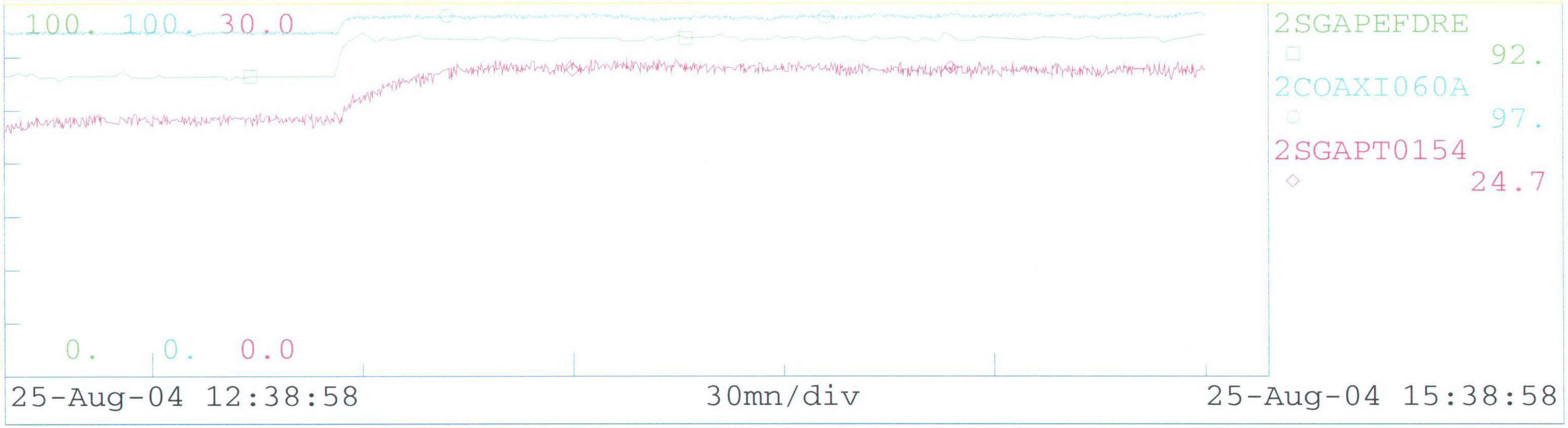

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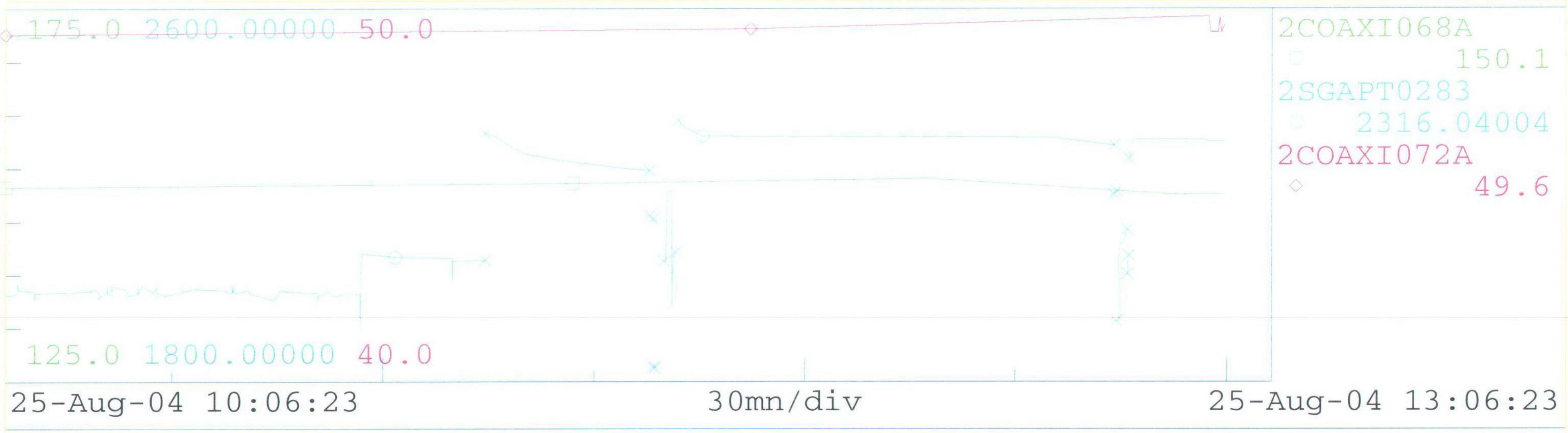

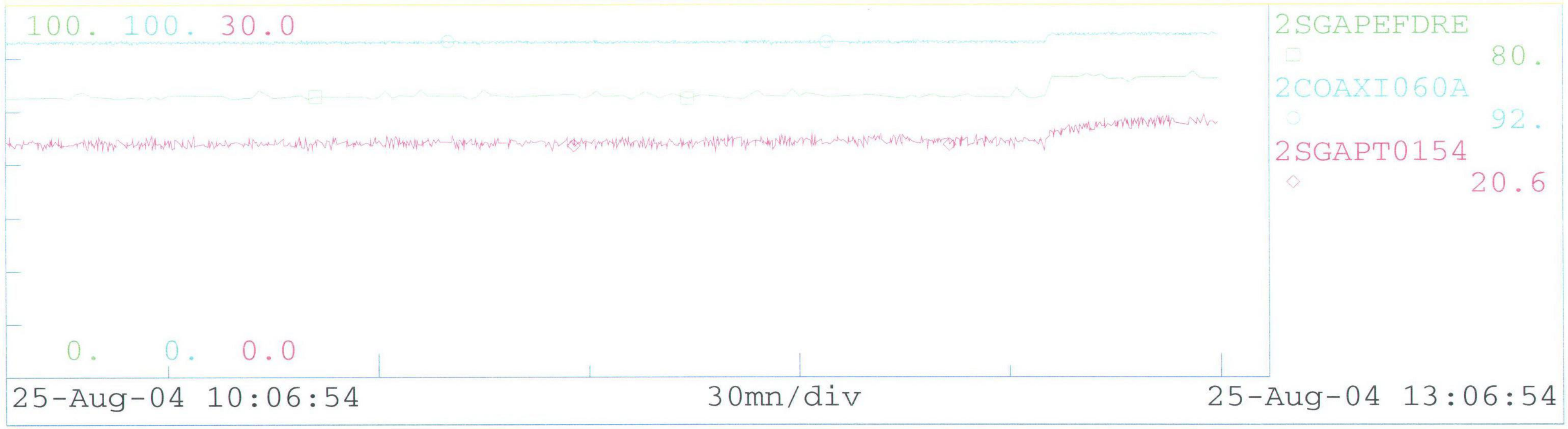

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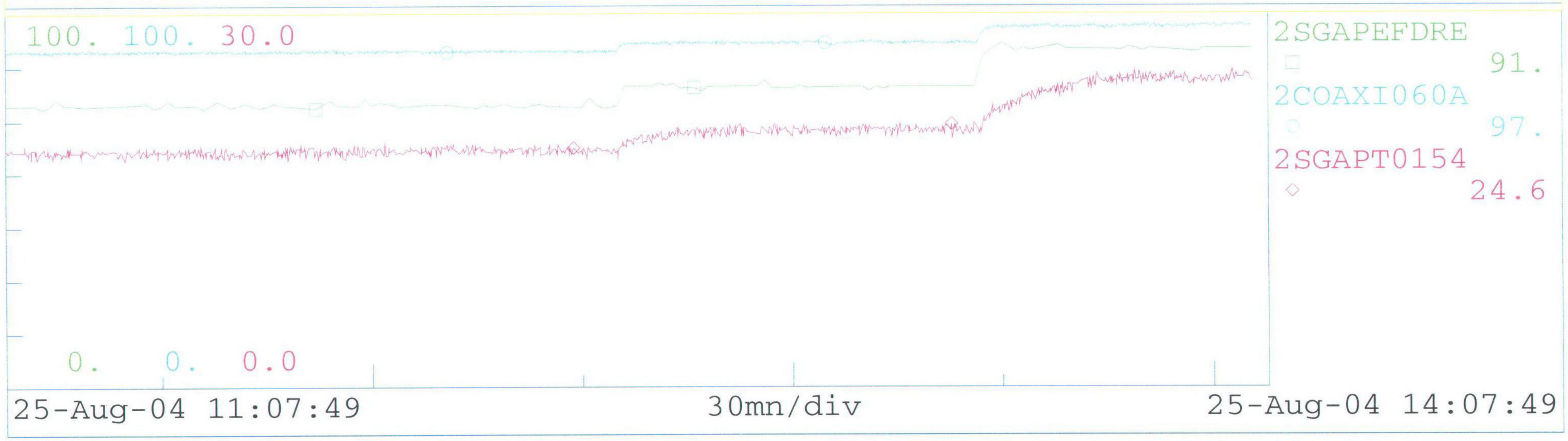

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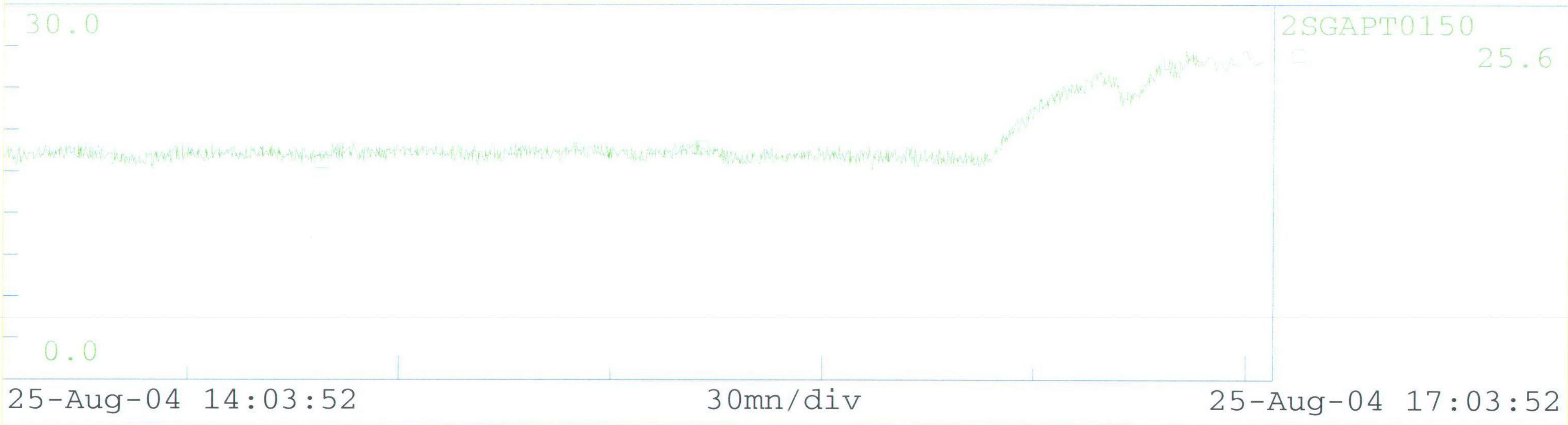

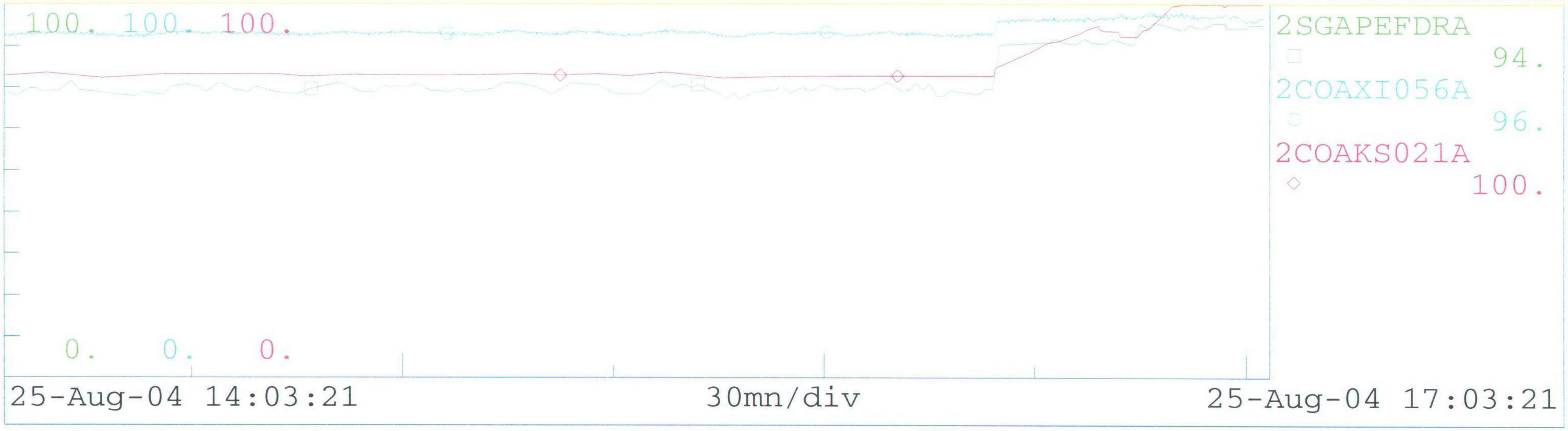

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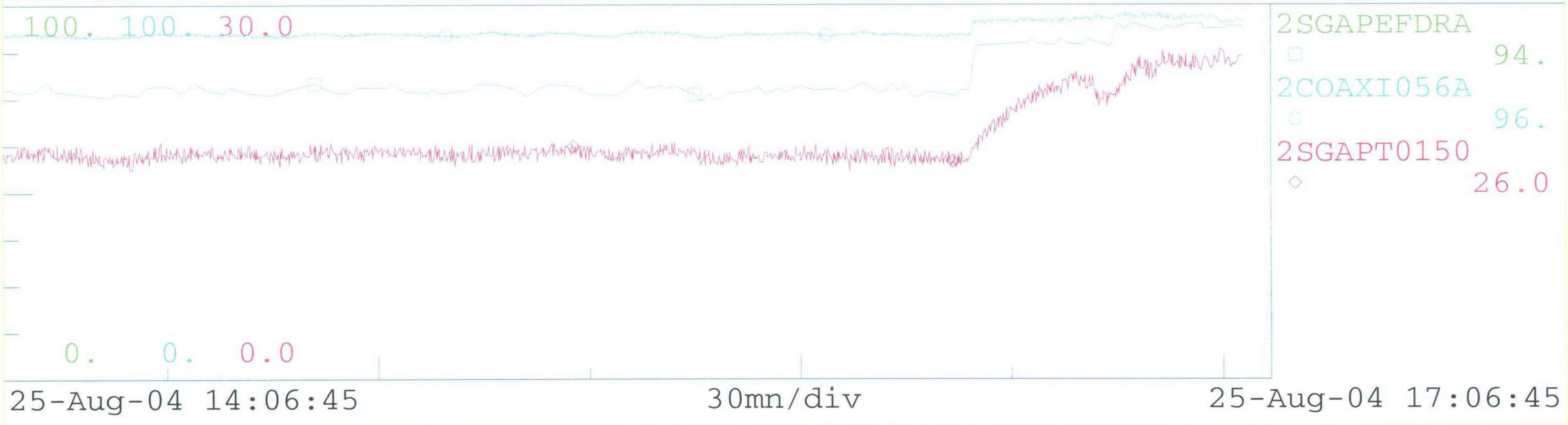

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IP12_002886

F[illegible]nted out for: UNIT2OP - 25-Aug-04 17:04:00 A mill Stationary

0 Messages U2 Pulv U2 Pulv Operating data 25-Aug-04 17:04:00

Unit 2 950.3 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow375.8TPH	64.3	0.1	53.1	52.9	53.7	53.4	50.8	52.1
Feeder Speed	94.5	0.1	77.4	77.6	78.1	77.8	73.8	77.5
Amps (Duct Pr49.4)	65.4	0.0	61.8	71.2	57.5	69.2	68.9	74.9
Coal Pipe Vel	4295.	1.	4353.	4254.	4081.	4040.	4259.	4373.
PA Flow %	96.8	0.1	97.3	94.9	91.1	90.4	95.0	97.7
(Duct Pr PA Damper Pos	99.9	1.4	80.3	78.0	76.1	67.6	69.2	89.4
SA Damper Pos	90.9	23.0	72.7	77.9	78.5	78.3	68.8	73.8
PA Mass Flow	3813.	3.	3854.	3766.	3599.	3551.	3773.	3864.
Pulv DP (NOx 0.46)	24.9	2.7	20.3	16.4	20.2	16.8	11.7	20.4
Air to Fuel Ratio	1.77	1.31	2.20	2.15	2.04	2.03	2.25	2.21
Pulv Inlet Temp	348.0	120.8	305.7	315.2	321.9	348.3	310.9	363.5
Pulv Outlet Temp	150.6	95.9	151.4	150.9	150.9	150.6	150.1	151.5
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	-4.0	0.0
Air Bias	0.0	0.0	9.1	4.2	0.0	0.0	6.1	7.8
Hyd Skid Pr Fdbk	2190.	4.	2354.	2207.	2295.	2327.	2379.	1405.
Hyd Skid Pr Setpt	2400.	1149.	2360.	2349.	2372.	2363.	2252.	2314.

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P[illegible]nted out for: UNIT2OP - 25-Aug-04 17:02:28

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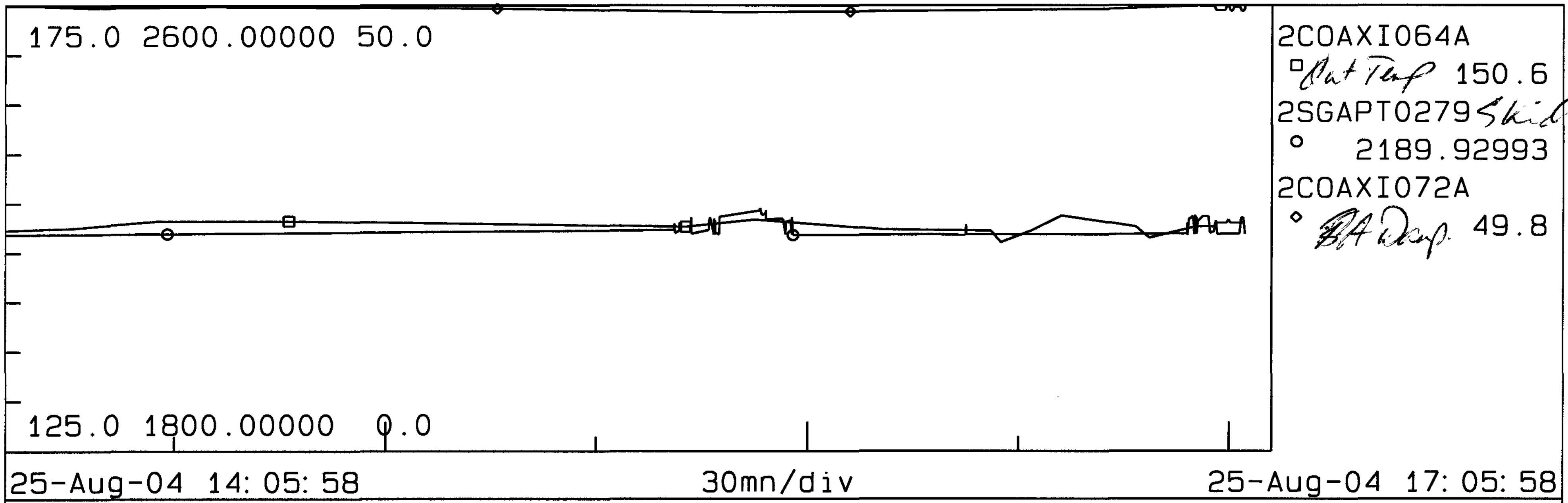

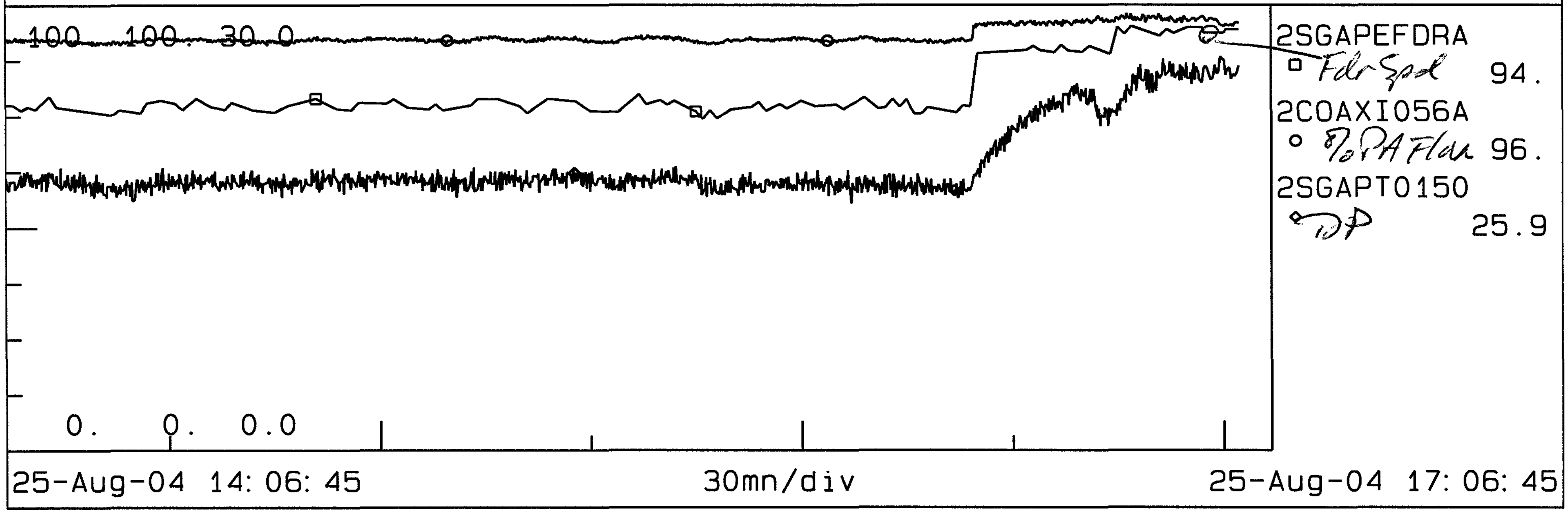

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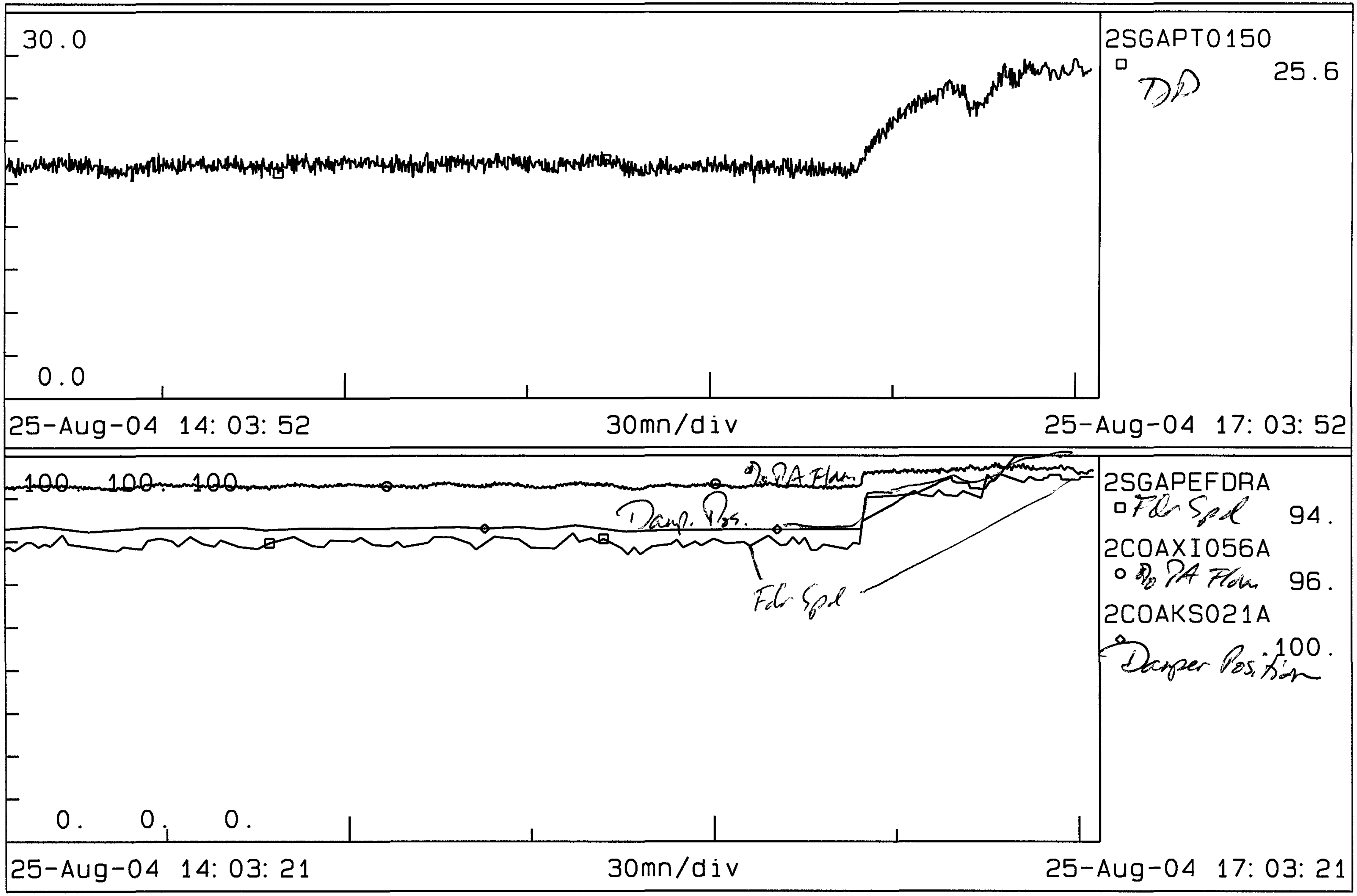

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[redacted] 0 Messages U2 Pulv U2 Pulv Operating data 25-Aug-04 17:10:28

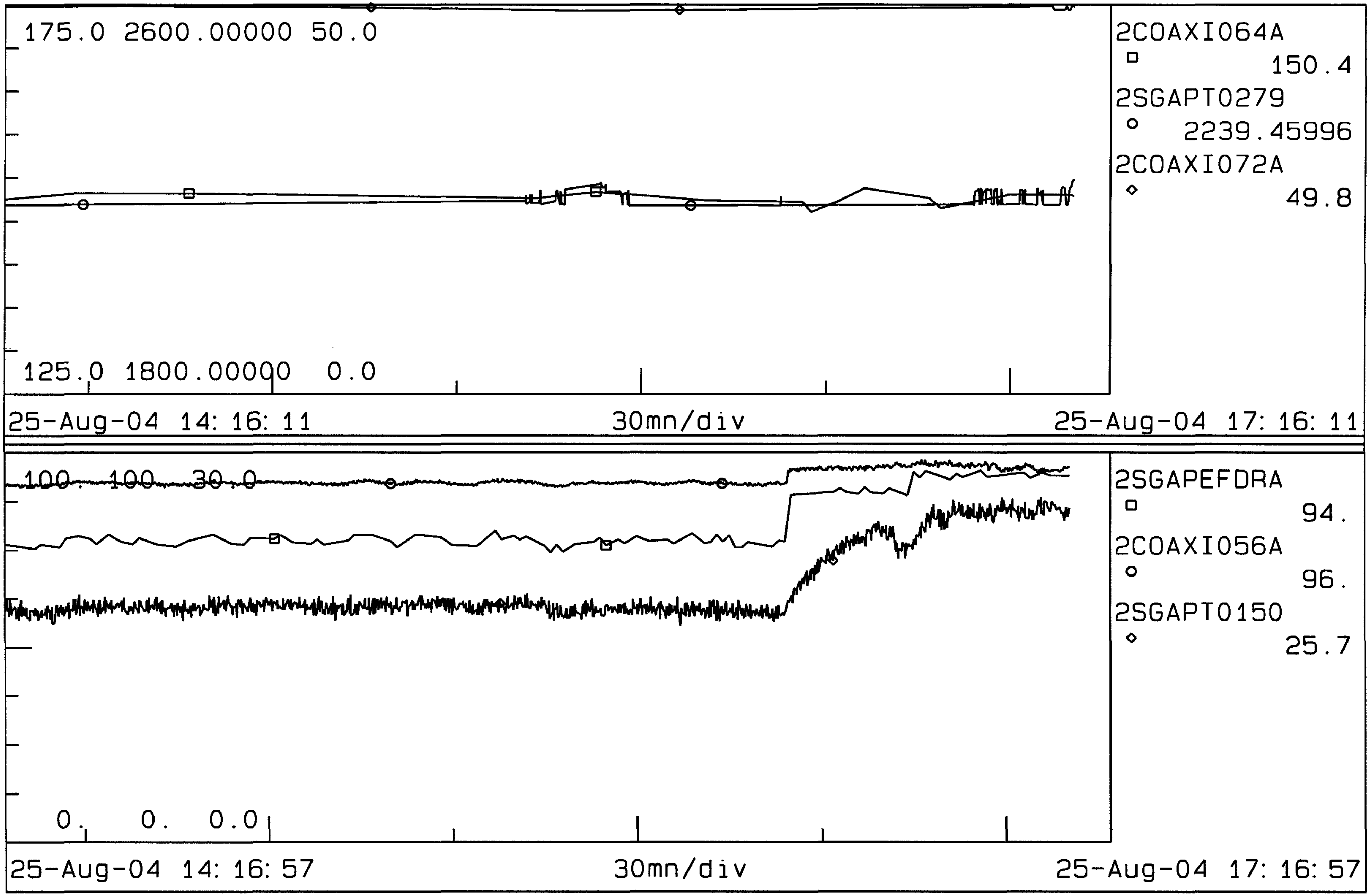
Unit 2 951.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow378.7TPH	63.9	0.1	55.2	53.5	54.2	54.0	51.4	54.1
Feeder Speed	94.0	0.1	79.8	78.8	79.1	78.5	75.5	76.7
Amps (Duct Pr49.8)	66.5	0.0	61.6	74.4	56.6	69.0	69.6	74.1
Coal Pipe Vel	4295.	3.	4383.	4227.	4064.	4030.	4256.	4393.
PA Flow %	96.3	0.1	97.6	94.8	91.8	90.9	95.8	98.8
PA Damper Pos (Duct Pr	100.	1.4	82.1	79.1	76.4	68.4	69.7	90.5
SA Damper Pos	90.2	23.0	74.6	79.2	79.7	79.6	70.1	75.2
PA Mass Flow	3802.	3.	3876.	3755.	3635.	3597.	3781.	3880.
Pulv DP (NOx 0.45)	25.4	2.7	20.8	16.7	20.3	17.0	12.0	22.4
Air to Fuel Ratio	1.76	1.74	2.14	2.08	2.02	2.02	2.21	2.24
Pulv Inlet Temp	348.0	120.9	305.4	313.6	322.2	348.6	311.5	360.2
Pulv Outlet Temp	150.4	96.2	150.6	150.6	151.4	150.1	149.4	150.1
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	-4.0	0.0
Air Bias	0.0	0.0	9.1	4.2	0.0	0.0	6.1	7.8
Hyd Skid Pr Fdbk	2239.	4.	2354.	2254.	2295.	2329.	2385.	1396.
Hyd Skid Pr Setpt	2400.	1149.	2400.	2400.	2382.	2366.	2289.	2384.

EndTim= 25-Aug-04 17:10:28 /EvalTim= 25-Aug-04 17:10:28 /PanRate= 0

IP12_002890

[redacted]ed out for: UNIT2OP - 25-Aug-04 17: 10: 24 Amill

0 Messages U2 Pulv U2 Pulv Operating data 25-Aug-04 17: 10: 24



EndTim= 25-Aug-04 17: 10: 24 /EvalTim= 25-Aug-04 17: 10: 24 /PanRate= 0

IP12_002891

Printed out for: PHIL-H - 22-Sep-04 09:00:21 U2 6 mill Operation

0 Messages U2 Pulv U2 Pulv Operating data 22-Sep-04 09:00:21

Unit 2 947.8 MW	Pulv A	Pulv B	Pulv C	Tech Pulv D	Bad Pulv E	Pulv F	Pulv G	Bad Pulv H
Coal Flow366.8TPH	58.4	0.1	60.4	59.2	59.7	BadI	60.4	59.6
Feeder Speed	88.5	0.1	90.0	88.8	90.7	Calc	89.9	88.5
Amps (Duct Pr51.8)	64.9	0.0	63.9	65.9	62.0	0.0	64.6	78.8
Coal Pipe Vel	4326.	1.	4274.	4234.	4275.	4.	4401.	4229.
PA Flow %	96.7	0.0	96.2	96.0	95.9	0.1	99.5	94.9
PA Damper Pos (Duct Pr	86.6	1.4	83.2	78.1	82.1	1.2	73.3	84.3
SA Damper Pos	83.8	23.0	84.4	88.2	88.5	28.0	83.9	83.7
PA Mass Flow	3827.	1.	3842.	3801.	3797.	5.	3948.	3748.
Pulv DP (NOx 0.34	22.9	2.7	24.8	20.5	23.5	0.0	15.4	18.0
Air to Fuel Ratio	1.92	0.44	1.87	1.91	1.85	Calc	1.93	1.87
Pulv Inlet Temp	314.5	86.6	304.8	312.0	323.5	88.0	355.5	374.8
Pulv Outlet Temp	150.6	77.6	151.1	146.9	152.5	82.3	150.1	150.1
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	0.0	0.0
Air Bias	1.2	0.0	3.3	0.3	0.0	6.3	4.1	0.0
Hyd Skid Pr Fdbk	2225.	1.	2473.	2280.	2104.	394.	2475.	2245.
Hyd Skid Pr Setpt	2400.	1149.	2400.	2400.	2400.	1149.	2400.	2400.

EndTim= 22-Sep-04 09:00:20 /EvalTim= 22-Sep-04 09:00:20 /PanRate= 0

IP12_002892

Printed out for: PHIL-H - 22-Sep-04 13:56:06

0-Messages U1 Pulv U1 Pulv Operating data 22-Sep-04 13:56:06

Unit 1 946.8 MW	Pulv A	Pulv B	Tech Pulv C	Pulv D	BPI Pulv E	Pulv F	B&W AR Pulv G	B&W Pulv H
Coal Flow355.7TPH	50.3	51.4	0.0	51.9	51.7	51.8	50.1	52.5
Feeder Speed	74.7	74.7	0.0	76.8	75.9	75.4	73.2	76.3
Amps (Duct Pr44.2)	56.4	66.7	0.0	64.4	62.9	49.7	43.0	67.9
Coal Pipe Vel	4555.	4329.	0.	4484.	4297.	4474.	4730.	4604.
PA Flow %	93.8	89.7	0.0	91.5	88.7	91.8	97.0	95.3
PA Damper Pos	78.7	77.4	1.0	69.3	77.8	78.5	82.0	78.7
SA Damper Pos	70.0	70.4	31.6	70.4	70.5	74.3	67.1	68.6
PA Mass Flow	3702.	3533.	0.	3627.	3495.	3641.	3834.	3756.
Pulv DP (NOx 0.37)	14.0	10.8	0.0	11.0	14.5	13.9	16.3	11.6
Air to Fuel Ratio	2.19	2.09	Calc	2.08	2.03	2.13	2.31	2.17
Pulv Inlet Temp	293.3	293.8	50.9	288.8	311.1	305.3	308.7	303.9
Pulv Outlet Temp	149.4	146.9	67.3	152.3	148.9	148.6	150.9	147.0
Coal Bias	0.0	0.0	0.0	0.0	0.0	0.0	-2.3	-1.9
Air Bias	7.2	0.0	4.8	2.4	0.0	2.7	7.8	6.7
Hyd Skid Pr Fdbk	0.	2258.	0.	2063.	2091.	1.	2294.	2305.
Hyd Skid Pr Setpt	2250.	2290.	1149.	2305.	2284.	2304.	2241.	2330.

EndTim= 22-Sep-04 13:56:06 /EvalTim= 22-Sep-04 13:56:06 /PanRate= 0

Printed out for: PHIL-H - 22-Sep-04 13:51:13

0-Messages U1 Pulv 2 Unit 1 Pulv data 22-Sep-04 13:51:13

Unit 1 948.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Burner Location	3rd row Front	1st row Front	2nd row Rear	4th row Rear	4th row Front	2nd row Front	1st row Rear	3rd row Rear
Motors						TECO	TECO	
Pulv Status	ON	ON	OFF	ON	ON	ON	ON	ON
Feeder Speed	73.3	74.5	0.0	75.8	74.9	75.0	72.7	77.0
Amps	56.9	66.0	0.0	65.5	64.4	50.4	44.0	69.2
Stator Temp (C)	95.4	100.	28.5	109.	110.	69.8	59.8	145.
Mtr Brg Temp-IB	154.	152.	71.0	154.	160.	141.	138.	131.
Mtr Brg Temp-OB	123.	139.	70.4	126.	150.	133.	127.	144.
Rotating Throat			Tech		BPI		B&W RR	B&W
Backplate Ave T	956.	856.	1023.	923.	964.	907.	900.	926.
SA Damper Pos	68.8	69.0	31.5	69.0	69.0	72.7	65.6	67.3
SA Windbox Press	1.7	1.4	0.0	1.5	1.5	1.8	0.0	1.1
Coal Pipe Ave T	632.	616.	650.	626.	638.	634.	613.	612.
Previous Rotating							Alstom	SW

EndTim= 22-Sep-04 13:51:13 /EvalTim= 22-Sep-04 13:51:13 /PanRate= 0

Printed out for: PHIL-H - 22-Sep-04 13:56:15

0.Messages U2 Pulv U2 Pulv Operating data 22-Sep-04 13:56:15

Unit 2 951.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow368.8TPH	61.4	0.1	62.5	62.2	62.4	BadI	62.1	61.4
Feeder Speed	91.4	0.1	91.5	90.3	91.7	Calc	92.9	88.9
Amps (Duct Pr51.6)	64.4	0.0	62.7	65.1	62.0	0.0	63.4	72.7
Coal Pipe Vel	4747.	1.	4719.	4673.	4694.	5.	4848.	4668.
PA Flow %	98.3	0.0	97.8	96.7	96.7	0.1	100.	96.4
PA Damper Pos	87.2	1.4	83.6	79.9	82.8	1.2	74.2	83.9
SA Damper Pos	86.8	23.0	87.4	90.8	91.2	28.0	86.9	86.7
PA Mass Flow	3869.	1.	3846.	3816.	3830.	5.	3955.	3755.
Pulv DP (NOx 0.32)	21.7	2.7	23.8	20.5	23.0	0.0	15.9	17.7
Air to Fuel Ratio	1.87	0.44	1.85	1.86	1.85	Calc	1.88	1.89
Pulv Inlet Temp	321.6	86.1	321.4	325.8	334.8	99.9	353.3	397.4
Pulv Outlet Temp	150.4	79.8	151.3	146.4	147.8	83.9	149.7	148.9
Coal Bias	0.0	0.0	-4.0	0.0	0.0	0.0	0.0	0.0
Air Bias	1.2	0.0	3.3	0.3	0.0	6.3	4.1	0.0
Hyd Skid Pr Fdbk	2220.	2.	2474.	2282.	2125.	401.	2476.	2224.
Hyd Skid Pr Setpt	2400.	1149.	2400.	2400.	2400.	1149.	2400.	2400.

EndTim= 22-Sep-04 13:56:15 /EvalTim= 22-Sep-04 13:56:15 /PanRate= 0

Printed out for: PHIL-H - 22-Sep-04 13:51:00

0.Messages U2 PULV 2 Unit 2 Pulv Data 22-Sep-04 13:51:00

Unit 2 948.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Burner Location	3rd row Front	1st row Front	2nd row Rear	4th row Rear	4th row Front	2nd row Front	1st row Rear	3rd row Rear
Pulv Status	ON	OFF	ON	ON	ON	OFF	ON	ON
Feeder Speed	90.1	0.1	91.5	91.1	91.5	Calc	91.1	89.9
Amps	64.4	0.0	64.8	68.8	61.2	0.0	67.0	76.4
Stator Temp (C)	92.3	52.4	90.4	110.	90.5	46.1	98.8	116.
Mtr Brg Temp-IB	146.	78.6	151.	143.	147.	84.5	167.	168.
Mtr Brg Temp-OB	132.	76.1	130.	139.	135.	84.7	136.	147.
Rotating Throat				Tech	B&W RR			B&W
Backplate Ave T	147.	299.	23.	0.	25.	445.	20.	0.
SA Damper Pos	86.5	23.0	87.0	90.5	90.8	28.0	86.8	86.6
SA Windbox Press	3.5	0.0	3.2	3.3	3.4	0.0	2.5	3.5
Coal Pipe Ave T	0.	496.	43.	173.	38.	0.	42.	0.
Previous Rotating								SAS

EndTim= 22-Sep-04 13:51:00 /EvalTim= 22-Sep-04 13:51:00 /PanRate= 0

Pre-Test

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Printed out for:  PHIL-H                - 19-Apr-04 09:34:01
  0 Messages O2 Data     O2 Unit Comparisons                       19-Apr-04 09:34:01

 Data                                 Unit 1     Unit 2     U1    U2 SA DamperUnit 1 Unit 2
 Meas'd Load           MW             949.25     901.00    OFA       Pulv  A  75. A  71.
 East  Probe 1         % O2             2.17       1.75   %  4.1  5.4 Pulv  B  76. B  71.
       Probe 2         % O2             2.70       2.28    Inlets    Pulv  C  76. C  53.
       Probe 3         % O2             3.10       3.02   SW  99. BadI Pulv  D  76. D  78.
       Probe 4         % O2             3.89       1.79   SE 100. BadI Pulv  E  75. E  70.
       Average         % O2             2.97       2.21   NW  98. BadI Pulv  F  77. F  68.
 West  Probe 5         % O2             3.09       2.01   NE  99. BadI Pulv  G  20. G  71.
       Probe 6         % O2             1.75       3.54    1/3       Pulv  H  76. H  71.
       Probe 7         % O2             2.10       3.07   SW   2. BadI
       Probe 8         % O2             2.55       3.62   SE   3. BadICoal Bias  U1     U2
       Average         % O2             2.32       2.72   NW   0. BadI A Pulv   0.0    0.0
                                                          NE   7. BadI B Pulv   0.0    0.0
 Econ O2 Out Average% O2                2.63       2.41    2/3       C Pulv   0.0   -9.0
 Econ O2 Out Setpoint% O2               3.09       3.17   SW   0. BadI D Pulv   0.0    3.7
 O2 Trim Setpoint                       33.1       52.0   SE   0. BadI E Pulv   0.0   -2.1
 Total Air %                            78.8       75.0   NW   0. BadI F Pulv   0.0   -3.5
                                                          NE   0. BadI G Pulv   0.0    0.0
 Coal Flow             TPH             372.0      347.3              H Pulv   0.0    0.0
 # of Pulv In-service                     7.         7.    Flow
 Main Steam Pressure                  2403.6     2240.4   SW 103.   75.PA Bias Unit 1 Unit 2
 Stack NOx             PPM             248.       177.    SE  63.   80. A Pulv   7.4    0.0
 Scrubber NOx          PPM             268.       195.    NW  62.  112. B Pulv   0.0    5.4
 Stack Converted NOx LB/MBTU          0.409      0.300    NE  71.  107. C Pulv   2.9   15.0
 Target NOx            LB/MBTU        0.433      0.424     299.    373. D Pulv   0.0    2.3
 Scrubber Inlet SO2    PPM             452.2      395.2              E Pulv   3.8    6.6
                                                                     F Pulv   3.0    9.0
 PSH/RH Bias Dmpr Pos      BadI/ 91.   84./ 92.                      G Pulv   0.1    0.0
 MS/RH Temps          1006.5/ 999.6 1005.3/1011.1                    H Pulv   6.0    4.8

EndTim= 19-Apr-04 09:34:01 /EvalTim= 19-Apr-04 09:34:01 /PanRate= 0
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Pre-Test

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Printed out for: UNIT1OP                - 19-Apr-04 10:41:46
 0 Messages O2 Data    O2 Unit Comparisons                                19-Apr-04 10:41:46

Data                             Unit 1     Unit 2      U1    U2 SA DamperUnit 1 Unit 2
Meas'd Load          MW          951.75     900.75     OFA         Pulv   A  73. A  72.
East  Probe 1        % O2          1.84       1.86     %   4.2  5.4 Pulv   B  73. B  71.
      Probe 2        % O2          2.26       2.16      Inlets      Pulv   C  74. C  53.
      Probe 3        % O2          3.11       2.71     SW  99. BadI Pulv   D  73. D  78.
      Probe 4        % O2          3.83       1.52     SE 100. BadI Pulv   E  73. E  71.
      Average        % O2          2.78       1.91     NW  98. BadI Pulv   F  74. F  69.
West  Probe 5        % O2          2.79       2.51     NE  99. BadI Pulv   G  20. G  71.
      Probe 6        % O2          1.45       4.24      1/3         Pulv   H  74. H  71.
      Probe 7        % O2          1.47       2.98     SW   2. BadI
      Probe 8        % O2          1.96       2.97     SE   3. BadICoal Bias  U1      U2
      Average        % O2          1.93       2.76     NW   0. BadI A Pulv    0.0     0.0
                                                       NE   7. BadI B Pulv    0.0     0.0
Econ O2 Out Average% O2            2.32       2.35      2/3         C Pulv    0.0     0.0
Econ O2 Out Setpoint% O2           3.09       3.17     SW   0. BadI D Pulv    0.0     3.7
                                                       SE   0. BadI E Pulv    0.0    -2.1
O2 Trim Setpoint                   33.1       52.0     NW   0. BadI F Pulv    0.0    -3.5
Total Air %                        78.5       75.1     NE   0. BadI G Pulv    0.0     0.0
                                                                    H Pulv    0.0     0.0
Coal Flow            TPH          369.4      348.9      Flow
# of Pulv In-service                 7.         7.     SW  99.  79.PA Bias Unit 1 Unit 2
Main Steam Pressure              2415.6     2244.0     SE  60.  87. A Pulv    7.4     0.0
Stack NOx            PPM          247.       176.      NW  62. 105. B Pulv    0.0     5.4
Scrubber NOx         PPM          265.       195.      NE  68. 106. C Pulv    2.9     0.0
Stack Converted NOxLB/MBTU        0.404      0.299     288. 381.    D Pulv    0.0     2.3
Target NOx           LB/MBTU      0.433      0.428                  E Pulv    3.8     6.6
Scrubber Inlet SO2 PPM            448.4      397.2                  F Pulv    3.0     9.0
PSH/RH Bias Dmpr Pos      BadI/ 91.   84./ 76.                      G Pulv    0.1     0.0
MS/RH Temps          1004.5/1011.1 1006.2/ 999.0                    H Pulv    6.0     4.8

EndTim= 19-Apr-04 10:41:46 /EvalTim= 19-Apr-04 10:41:46 /PanRate= 0
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Printed out for: UNIT1OP - 19-Apr-04 11:17:28 Opened OFA Dampers 3/3

0 Messages O2 Data O2 Unit Comparisons 19-Apr-04 11:17:28

Data		Unit 1	Unit 2
Meas'd Load	MW	947.75	899.25
East Probe 1	% O2	2.50	1.72
Probe 2	% O2	2.75	2.15
Probe 3	% O2	2.70	2.83
Probe 4	% O2	2.41	1.89
Average	% O2	2.61	1.91
West Probe 5	% O2	2.47	2.30
Probe 6	% O2	3.29	4.05
Probe 7	% O2	2.58	2.75
Probe 8	% O2	2.18	3.03
Average	% O2	2.62	2.76
Econ O2 Out Average	% O2	2.60	2.37
Econ O2 Out Setpoint	% O2	3.09	3.16
O2 Trim Setpoint		33.1	52.0
Total Air %	57,730,000 lb/hr	78.2	74.9
Coal Flow	TPH	370.2	348.0
# of Pulv In-service		7.	7.
Main Steam Pressure		2395.8	2235.6
Stack NOx	PPM	203.	177.
Scrubber NOx	PPM	223.	198.
Stack Converted NOx	LB/MBTU	0.339	0.304
Target NOx	LB/MBTU	0.387	0.428
Scrubber Inlet SO2	PPM	452.8	402.5
PSH/RH Bias Dmpr Pos		105./ 58.	84./100.
MS/RH Temps		998.1/ 995.8	1007.0/ 992.0

	U1	U2
OFA		
%	13.6	5.9
Inlets		
SW	99.	BadI
SE	100.	BadI
NW	98.	BadI
NE	99.	BadI
1/3		
SW	97.	BadI
SE	100.	BadI
NW	90.	BadI
NE	99.	BadI
2/3		
SW	98.	BadI
SE	96.	BadI
NW	99.	BadI
NE	99.	BadI
Flow		
SW	250.	77.
SE	238.	80.
NW	256.	114.
NE	231.	99.
	975.	370.

SA Damper	Unit 1	Unit 2
Pulv A	76	A 73.
Pulv B	76.	B 73.
Pulv C	77.	C 53.
Pulv D	76.	D 80.
Pulv E	76.	E 73.
Pulv F	78.	F 71.
Pulv G	20.	G 73.
Pulv H	77.	H 73.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	0.0
D Pulv	0.0	3.7
E Pulv	0.0	-2.1
F Pulv	0.0	-3.5
G Pulv	0.0	0.0
H Pulv	0.0	0.0

PA Bias	Unit 1	Unit 2
A Pulv	7.4	0.0
B Pulv	0.0	5.4
C Pulv	2.9	0.0
D Pulv	0.0	2.3
E Pulv	3.8	6.6
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	6.0	4.8

EndTim= 19-Apr-04 11:17:28 /EvalTim= 19-Apr-04 11:17:28 /PanRate= 0

IP12_002899

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Printed out for:  UNIT1OP           - 19-Apr-04 11:25:08   SA 20% => -2% BIAS
  0 Messages O2 Data    O2 Unit Comparisons                    19-Apr-04 11:25:08

 Data                             Unit 1     Unit 2     U1    U2 SA DamperUnit 1 Unit 2
 Meas'd Load          MW          950.75     899.75     OFA        Pulv  A  73. A  70.
 East  Probe 1        % O2          2.66       1.67    % 13.2  5.8 Pulv  B  74. B  70.
      Probe 2         % O2          2.93       2.08     Inlets     Pulv  C  74. C  53.
      Probe 3         % O2          2.58       2.86    SW  99. BadI Pulv  D  73. D  77.
      Probe 4         % O2          2.47       1.82    SE 100. BadI Pulv  E  73. E  70.
      Average         % O2          2.75       2.03    NW  98. BadI Pulv  F  75. F  68.
 West  Probe 5        % O2          2.41       2.62    NE  99. BadI Pulv  G  20. G  70.
      Probe 6         % O2          3.18       4.05     1/3        Pulv  H  74. H  70.
      Probe 7         % O2          2.42       2.54    SW  97. BadI
      Probe 8         % O2          2.01       3.15    SE 100. BadICoal Bias  U1     U2
      Average         % O2          2.55       2.64    NW  90. BadI A Pulv   0.0    0.0
                                                       NE  99. BadI B Pulv   0.0    0.0
 Econ O2 Out Average% O2            2.61       2.35     2/3         C Pulv   0.0    0.0
 Econ O2 Out Setpoint% O2           3.09       3.16    SW  98. BadI D Pulv   0.0    3.7
 O2 Trim Setpoint                   33.1       52.0    SE  96. BadI E Pulv   0.0   -2.1
 Total Air %                        79.0       75.6    NW  99. BadI F Pulv   0.0   -3.5
 Coal Flow            TPH          375.6      349.4    NE  99. BadI G Pulv   0.0    0.0
 # of Pulv In-service                 7.         7.     Flow        H Pulv   0.0    0.0
 Main Steam Pressure              2373.6     2245.8    SW 249.  81.PA Bias Unit 1 Unit 2
 Stack NOx            PPM          203.       178.     SE 236.  81. A Pulv   7.4    0.0
 Scrubber NOx         PPM          225.       196.     NW 255. 115. B Pulv   0.0    5.4
 Stack Converted NOx LB/MBTU       0.333      0.303    NE 232. 103. C Pulv   2.9    0.0
 Target NOx          LB/MBTU       0.387      0.428      972.  380. D Pulv   0.0    2.3
 Scrubber Inlet SO2  PPM           456.3      396.9                 E Pulv   3.8    6.6
 PSH/RH Bias Dmpr Pos       105./ 60.   84./100.                    F Pulv   3.0    9.0
                                                                    G Pulv   0.1    0.0
 MS/RH Temps            1014.6/1004.1 1010.3/ 991.2                 H Pulv   6.0    4.8

EndTim= 19-Apr-04 11:25:08 /EvalTim= 19-Apr-04 11:25:08 /PanRate= 0
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Printed out for: UNIT1OP - 19-Apr-04 11:31:10 SA 40%: ⇒ -4% BAAS

0 Messages O2 Data O2 Unit Comparisons 19-Apr-04 11:31:10

Data		Unit 1	Unit 2
Meas'd Load	MW	951.75	898.00
East Probe 1	% O2	2.21	1.76
Probe 2	% O2	2.77	2.15
Probe 3	% O2	2.62	2.97
Probe 4	% O2	2.87	1.74
Average	% O2	2.62	1.95
West Probe 5	% O2	2.32	2.15
Probe 6	% O2	3.28	4.36
Probe 7	% O2	2.59	3.53
Probe 8	% O2	2.29	3.91
Average	% O2	2.64	2.91
Econ O2 Out Average	% O2	2.65	2.47
Econ O2 Out Setpoint	% O2	3.09	3.16
O2 Trim Setpoint		33.1	52.0
Total Air %		78.8	75.3
Coal Flow	TPH	372.6	348.6
# of Pulv In-service		7.	7.
Main Steam Pressure		2393.4	2234.4
Stack NOx	PPM	203.	180.
Scrubber NOx	PPM	224.	200.
Stack Converted NOx	LB/MBTU	0.331	0.308
Target NOx	LB/MBTU	0.386	0.428
Scrubber Inlet SO2	PPM	452.2	400.1
PSH/RH Bias Dmpr Pos		105./ 56.	84./100.
MS/RH Temps		1010.5/1012.0	1006.2/ 993.0

	U1	U2
OFA %	13.7	5.6
Inlets		
SW	99.	BadI
SE	100.	BadI
NW	98.	BadI
NE	99.	BadI
1/3		
SW	97.	BadI
SE	100.	BadI
NW	90.	BadI
NE	99.	BadI
2/3		
SW	98.	BadI
SE	96.	BadI
NW	99.	BadI
NE	99.	BadI
Flow		
SW	253.	81.
SE	235.	83.
NW	262.	115.
NE	230.	95.
	980.	385.

SA Damper	Unit 1		Unit 2
Pulv A	72.	A	73.
Pulv B	72.	B	73.
Pulv C	73.	C	53.
Pulv D	72.	D	80.
Pulv E	72.	E	73.
Pulv F	73.	F	71.
Pulv G	20.	G	73.
Pulv H	73.	H	73.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	0.0
D Pulv	0.0	3.7
E Pulv	0.0	-2.1
F Pulv	0.0	-3.5
G Pulv	0.0	0.0
H Pulv	0.0	0.0

PA Bias	Unit 1	Unit 2
A Pulv	7.4	0.0
B Pulv	0.0	5.4
C Pulv	2.9	0.0
D Pulv	0.0	2.3
E Pulv	3.8	6.6
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	6.0	4.8

EndTim= 19-Apr-04 11:31:10 /EvalTim= 19-Apr-04 11:31:10 /PanRate= 0

IP12_002901

Printed out for: UNIT1OP - 19-Apr-04 11:36:26 SA 69% => -6% BIAS

0 Messages O2 Data O2 Unit Comparisons 19-Apr-04 11:36:26

Data		Unit 1	Unit 2
Meas'd Load	MW	950.75	901.75
East Probe 1	% O2	2.63	1.61
Probe 2	% O2	2.96	2.13
Probe 3	% O2	2.64	2.89
Probe 4	% O2	2.65	1.69
Average	% O2	2.73	1.94
West Probe 5	% O2	2.49	2.04
Probe 6	% O2	3.31	3.56
Probe 7	% O2	2.64	2.99
Probe 8	% O2	2.09	3.28
Average	% O2	2.62	2.63
Econ O2 Out Average	% O2	2.65	2.29
Econ O2 Out Setpoint	% O2	3.09	3.16
O2 Trim Setpoint		33.1	52.0
Total Air %		78.7	75.7
Coal Flow	TPH	372.4	352.0
# of Pulv In-service		7.	7.
Main Steam Pressure		2408.4	2229.6
Stack NOx	PPM	203.	180.
Scrubber NOx	PPM	224	200.
Stack Converted NOx	LB/MBTU	0.331	0.308
Target NOx	LB/MBTU	0.386	0.428
Scrubber Inlet SO2	PPM	452.2	400.1
PSH/RH Bias Dmpr Pos		105./ 51.	84./100.
MS/RH Temps		1004.1/1013.7	1010.5/ 996.5

	U1	U2
OFA		
%	13.2	5.6
Inlets		
SW	99.	BadI
SE	99.	BadI
NW	98.	BadI
NE	99.	BadI
1/3		
SW	97.	BadI
SE	100.	BadI
NW	90.	BadI
NE	99.	BadI
2/3		
SW	98.	BadI
SE	96.	BadI
NW	99.	BadI
NE	99.	BadI
Flow		
SW	253.	82.
SE	235.	83.
NW	262.	113.
NE	237.	108.
	976.	386.

SA Damper	Unit 1		Unit 2
Pulv A	69.	A	74.
Pulv B	70.	B	74.
Pulv C	70.	C	53.
Pulv D	70.	D	81.
Pulv E	70.	E	73.
Pulv F	71.	F	72.
Pulv G	20.	G	74.
Pulv H	70.	H	74.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	0.0
D Pulv	0.0	3.7
E Pulv	0.0	-2.1
F Pulv	0.0	-3.5
G Pulv	0.0	0.0
H Pulv	0.0	0.0

PA Bias	Unit 1	Unit 2
A Pulv	7.4	0.0
B Pulv	0.0	5.4
C Pulv	2.9	0.0
D Pulv	0.0	2.3
E Pulv	3.8	6.6
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	6.0	4.8

EndTim= 19-Apr-04 11:36:26 /EvalTim= 19-Apr-04 11:36:26 /PanRate= 0

IP12_002902

Printed out for: UNIT1OP - 19-Apr-04 11:41:54 SA 100% ⇒ -10% BIAS

0 Messages O2 Data O2 Unit Comparisons 19-Apr-04 11:41:54

Data		Unit 1	Unit 2
Meas'd Load	MW	950.75	901.75
East Probe 1	% O2	2.22	1.95
Probe 2	% O2	2.71	2.46
Probe 3	% O2	2.42	3.25
Probe 4	% O2	3.00	1.96
Average	% O2	2.60	2.25
West Probe 5	% O2	2.32	2.42
Probe 6	% O2	3.18	4.14
Probe 7	% O2	2.51	3.54
Probe 8	% O2	2.18	3.05
Average	% O2	2.63	2.87
Econ O2 Out Average	% O2	2.55	2.57
Econ O2 Out Setpoint	% O2	3.09	3.16
O2 Trim Setpoint		33.1	52.0
Total Air %		78.7	75.5
Coal Flow	TPH	370.6	350.1
# of Pulv In-service		7.	7.
Main Steam Pressure		2412.0	2237.4
Stack NOx	PPM	206.	180.
Scrubber NOx	PPM	222.	197.
Stack Converted NOx	LB/MBTU	0.338	0.307
Target NOx	LB/MBTU	0.386	0.428
Scrubber Inlet SO2	PPM	454.1	395.2
PSH/RH Bias Dmpr Pos		105./ 47.	84./100.
MS/RH Temps		1003.7/1012.4	1008.9/1001.1

	U1	U2
OFA %	13.8	5.6
Inlets		
SW	99.	BadI
SE	99.	BadI
NW	98.	BadI
NE	99.	BadI
1/3		
SW	97.	BadI
SE	100.	BadI
NW	90.	BadI
NE	99.	BadI
2/3		
SW	98.	BadI
SE	96.	BadI
NW	99.	BadI
NE	99.	BadI
Flow		
SW	256.	82.
SE	246.	86.
NW	256.	114.
NE	241.	98.
	998.	390.

SA Damper	Unit 1		Unit 2
Pulv A	67.	A	72.
Pulv B	67.	B	72.
Pulv C	66.	C	53.
Pulv D	67.	D	79.
Pulv E	67.	E	71.
Pulv F	67.	F	69.
Pulv G	20.	G	72.
Pulv H	68.	H	71.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	0.0
D Pulv	0.0	3.7
E Pulv	0.0	-2.1
F Pulv	0.0	-3.5
G Pulv	0.0	0.0
H Pulv	0.0	0.0

PA Bias	Unit 1	Unit 2
A Pulv	7.4	0.0
B Pulv	0.0	5.4
C Pulv	2.9	0.0
D Pulv	0.0	2.3
E Pulv	3.8	6.6
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	6.0	4.8

EndTim= 19-Apr-04 11:41:54 /EvalTim= 19-Apr-04 11:41:54 /PanRate= 0

IP12_002903

Printed out for: UNIT1OP 100% ⇒ -20% - 19-Apr-04 11:53:53 Post SA 50% ⇒ -10% 81%

0 Messages O2 Data O2 Unit Comparisons 19-Apr-04 11:53:53

Data		Unit 1	Unit 2
Meas'd Load	MW	949.25	899.75
East Probe 1	% O2	2.33	2.00
Probe 2	% O2	2.87	2.27
Probe 3	% O2	2.33	3.06
Probe 4	% O2	2.62	1.61
Average	% O2	2.56	2.05
West Probe 5	% O2	2.37	2.10
Probe 6	% O2	3.15	3.81
Probe 7	% O2	2.49	3.17
Probe 8	% O2	2.04	3.61
Average	% O2	2.59	2.79
Econ O2 Out Average	% O2	2.52	2.46
Econ O2 Out Setpoint	% O2	3.09	3.16
O2 Trim Setpoint		33.1	52.0
Total Air %	$720,000	78.4	75.1
Coal Flow	TPH	372.4	348.5
# of Pulv In-service		7.	7.
Main Steam Pressure		2395.8	2241.0
Stack NOx	PPM	206.	181.
Scrubber NOx	PPM	216.	198.
Stack Converted NOx	LB/MBTU	0.339	0.307
Target NOx	LB/MBTU	0.387	0.428
Scrubber Inlet SO2	PPM	451.6	399.1
PSH/RH Bias Dmpr Pos		105./ 40.	84./100.
MS/RH Temps		1003.3/1007.4	1008.6/1001.5

	U1	U2
OFA		
%	~~14.0~~	5.5
Inlets		
SW	99.	BadI
SE	99.	BadI
NW	98.	BadI
NE	99.	BadI
1/3		
SW	97.	BadI
SE	100.	BadI
NW	90.	BadI
NE	99.	BadI
2/3		
SW	98.	BadI
SE	96.	BadI
NW	99.	BadI
NE	99.	BadI
Flow		
SW	247.	79.
SE	245.	86.
NW	257.	113.
NE	246.	105.
	995.	383.

SA Damper	Unit 1		Unit 2
Pulv A	65.	A	72.
Pulv B	66.	B	72.
Pulv C	67.	C	53.
Pulv D	66.	D	78.
Pulv E	66.	E	71.
Pulv F	68.	F	69.
Pulv G	20.	G	72.
Pulv H	66.	H	71.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	0.0
D Pulv	0.0	3.7
E Pulv	0.0	-2.1
F Pulv	0.0	-3.5
G Pulv	0.0	0.0
H Pulv	0.0	0.0

PA Bias	Unit 1	Unit 2
A Pulv	7.4	0.0
B Pulv	0.0	5.4
C Pulv	2.9	0.0
D Pulv	0.0	2.3
E Pulv	3.8	6.6
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	6.0	4.8

EndTim= 19-Apr-04 11:53:53 /EvalTim= 19-Apr-04 11:53:53 /PanRate= 0

IP12_002904

Printed out for: UNIT1OP - 19-Apr-04 12:40:47 SA 50% → -10 BIAS

0 Messages O2 Data O2 Unit Comparisons 19-Apr-04 12:40:47

Last Test

Data		Unit 1	Unit 2
Meas'd Load	MW	950.25	899.00
East Probe 1	% O2	2.45	1.77
Probe 2	% O2	4.15	2.27
Probe 3	% O2	4.81	3.19
Probe 4	% O2	5.22	2.19
Average	% O2	4.26	2.20
West Probe 5	% O2	2.77	2.50
Probe 6	% O2	3.45	4.29
Probe 7	% O2	2.79	2.90
Probe 8	% O2	2.33	4.04
Average	% O2	2.83	3.00
Econ O2 Out Average	% O2	3.56	2.57
Econ O2 Out Setpoint	% O2	3.09	3.16
O2 Trim Setpoint		33.1	52.0
Total Air %	5,740,000 lbs/hr	78.7	75.7
Coal Flow	TPH	372.0	350.8
# of Pulv In-service		7.	7.
Main Steam Pressure		2404.8	2232.0
Stack NOx	PPM	205.	180.
Scrubber NOx	PPM	224.	197.
Stack Converted NOx	LB/MBTU	0.337	0.307
Target NOx	LB/MBTU	0.387	0.428
Scrubber Inlet SO2	PPM	453.1	393.6
PSH/RH Bias Dmpr Pos		105./ 30.	84./100.
MS/RH Temps		1001.7/1003.3	1004.5/ 994.0

	U1	U2
OFA		
%	~~13.8~~ 16%	5.5
Inlets		
SW	99.	BadI
SE	99.	BadI
NW	98.	BadI
NE	99.	BadI
1/3		
SW	97.	BadI
SE	100.	BadI
NW	90.	BadI
NE	99.	BadI
2/3		
SW	98.	BadI
SE	96.	BadI
NW	99.	BadI
NE	99.	BadI
Flow		
SW	260.	81.
SE	251.	82.
NW	258.	109.
NE	241.	113.
	1010.	385.

972 klbs/hr

SA Damper	Unit 1		Unit 2
Pulv A	65.	A	74.
Pulv B	65.	B	73.
Pulv C	67.	C	53.
Pulv D	65.	D	80.
Pulv E	66.	E	73.
Pulv F	67.	F	71.
Pulv G	20.	G	74.
Pulv H	66.	H	73.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	0.0
D Pulv	0.0	3.7
E Pulv	0.0	-2.1
F Pulv	0.0	-3.5
G Pulv	0.0	0.0
H Pulv	0.0	0.0

PA Bias	Unit 1	Unit 2
A Pulv	7.4	0.0
B Pulv	0.0	5.4
C Pulv	2.9	0.0
D Pulv	0.0	2.3
E Pulv	3.8	6.6
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	6.0	4.8

EndTim= 19-Apr-04 12:40:47 /EvalTim= 19-Apr-04 12:40:47 /PanRate= 0

IP12_002905

Printed out for: UNIT1OP - 19-Apr-04 12: 12: 18 SA 75% ⇒ 15% BIAS

0 Messages O2 Data O2 Unit Comparisons 19-Apr-04 12: 12: 18

Data		Unit 1	Unit 2
Meas'd Load	MW	950.00	900.50
East Probe 1	% O2	2.41	1.85
Probe 2	% O2	2.82	2.14
Probe 3	% O2	2.62	3.09
Probe 4	% O2	2.85	2.06
Average	% O2	2.63	2.19
West Probe 5	% O2	2.00	2.79
Probe 6	% O2	3.07	3.93
Probe 7	% O2	2.63	2.71
Probe 8	% O2	2.36	3.54
Average	% O2	2.55	2.87
Econ O2 Out Average	% O2	2.57	2.51
Econ O2 Out Setpoint	% O2	3.09	3.17
O2 Trim Setpoint		33.1	52.0
Total Air %		78.4	75.5
Coal Flow	TPH	372.6	350.2
# of Pulv In-service		7.	7.
Main Steam Pressure		2400.0	2245.8
Stack NOx	PPM	208.	181.
Scrubber NOx	PPM	220.	197.
Stack Converted NOx	LB/MBTU	0.340	0.309
Target NOx	LB/MBTU	0.387	0.428
Scrubber Inlet SO2	PPM	454.4	402.5
PSH/RH Bias Dmpr Pos		105./ 30.	84./100.
MS/RH Temps		1006.5/1002.5	1014.6/1001.5

	U1	U2
OFA %	13.8	6.0
Inlets		
SW	99.	BadI
SE	99.	BadI
NW	98.	BadI
NE	99.	BadI
1/3		
SW	97.	BadI
SE	100.	BadI
NW	90.	BadI
NE	99.	BadI
2/3		
SW	98.	BadI
SE	96.	BadI
NW	99.	BadI
NE	99.	BadI
Flow		
SW	253.	79.
SE	257.	89.
NW	259.	113.
NE	254.	116.
	1012.	396.

SA Damper	Unit 1	Unit 2
Pulv A	60.	A 70.
Pulv B	60.	B 71.
Pulv C	61.	C 53.
Pulv D	60.	D 77.
Pulv E	60.	E 70.
Pulv F	61.	F 68.
Pulv G	20.	G 70.
Pulv H	61.	H 70.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	0.0
D Pulv	0.0	3.7
E Pulv	0.0	-2.1
F Pulv	0.0	-3.5
G Pulv	0.0	0.0
H Pulv	0.0	0.0

PA Bias	Unit 1	Unit 2
A Pulv	7.4	0.0
B Pulv	0.0	5.4
C Pulv	2.9	0.0
D Pulv	0.0	2.3
E Pulv	3.8	6.6
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	6.0	4.8

EndTim= 19-Apr-04 12: 12: 18 /EvalTim= 19-Apr-04 12: 12: 18 /PanRate= 0

IP12_002906

Printed out for: UNIT1OP - 19-Apr-04 12:22:57 SA 75% => -15% BIAS

0 Messages O2 Data O2 Unit Comparisons 19-Apr-04 12:22:57

Data		Unit 1	Unit 2
Meas'd Load	MW	952.50	899.25
East Probe 1	% O2	2.17	1.73
Probe 2	% O2	2.41	2.02
Probe 3	% O2	2.19	2.80
Probe 4	% O2	2.85	1.79
Average	% O2	2.45	2.02
West Probe 5	% O2	2.43	2.32
Probe 6	% O2	3.21	4.23
Probe 7	% O2	2.57	3.13
Probe 8	% O2	2.19	3.76
Average	% O2	2.58	2.96
Econ O2 Out Average	% O2	2.52	2.47
Econ O2 Out Setpoint	% O2	3.09	3.16
O2 Trim Setpoint		~~33.1~~	52.0
Total Air %	5,766,000	78.9	74.9
Coal Flow	TPH	373.2	349.9
# of Pulv In-service		7.	7.
Main Steam Pressure		2394.6	2236.8
Stack NOx	PPM	210.	180.
Scrubber NOx	PPM	223.	199.
Stack Converted NOx	LB/MBTU	0.343	0.309
Target NOx	LB/MBTU	0.387	0.428
Scrubber Inlet SO2	PPM	453.1	397.4
PSH/RH Bias Dmpr Pos		105./ 30.	84./100.
MS/RH Temps		1007.4/1003.3	1004.1/ 996.2

	U1	U2
OFA 16.5%		
%	~~13.9~~	5.6
Inlets		
SW	99.	BadI
SE	99.	BadI
NW	98.	BadI
NE	99.	BadI
1/3		
SW	97.	BadI
SE	100.	BadI
NW	90.	BadI
NE	99.	BadI
2/3		
SW	98.	BadI
SE	96.	BadI
NW	99.	BadI
NE	99.	BadI
Flow		
SW	254.	83.
SE	249.	85.
NW	262.	107.
NE	247.	116.
	1012.	385.

1003 klb/h

SA Damper	Unit 1		Unit 2
Pulv A	61.	A	72.
Pulv B	61.	B	72.
Pulv C	62.	C	53.
Pulv D	62.	D	79.
Pulv E	62.	E	72.
Pulv F	62.	F	70.
Pulv G	20.	G	72.
Pulv H	63.	H	72.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	0.0
D Pulv	0.0	3.7
E Pulv	0.0	-2.1
F Pulv	0.0	-3.5
G Pulv	0.0	0.0
H Pulv	0.0	0.0

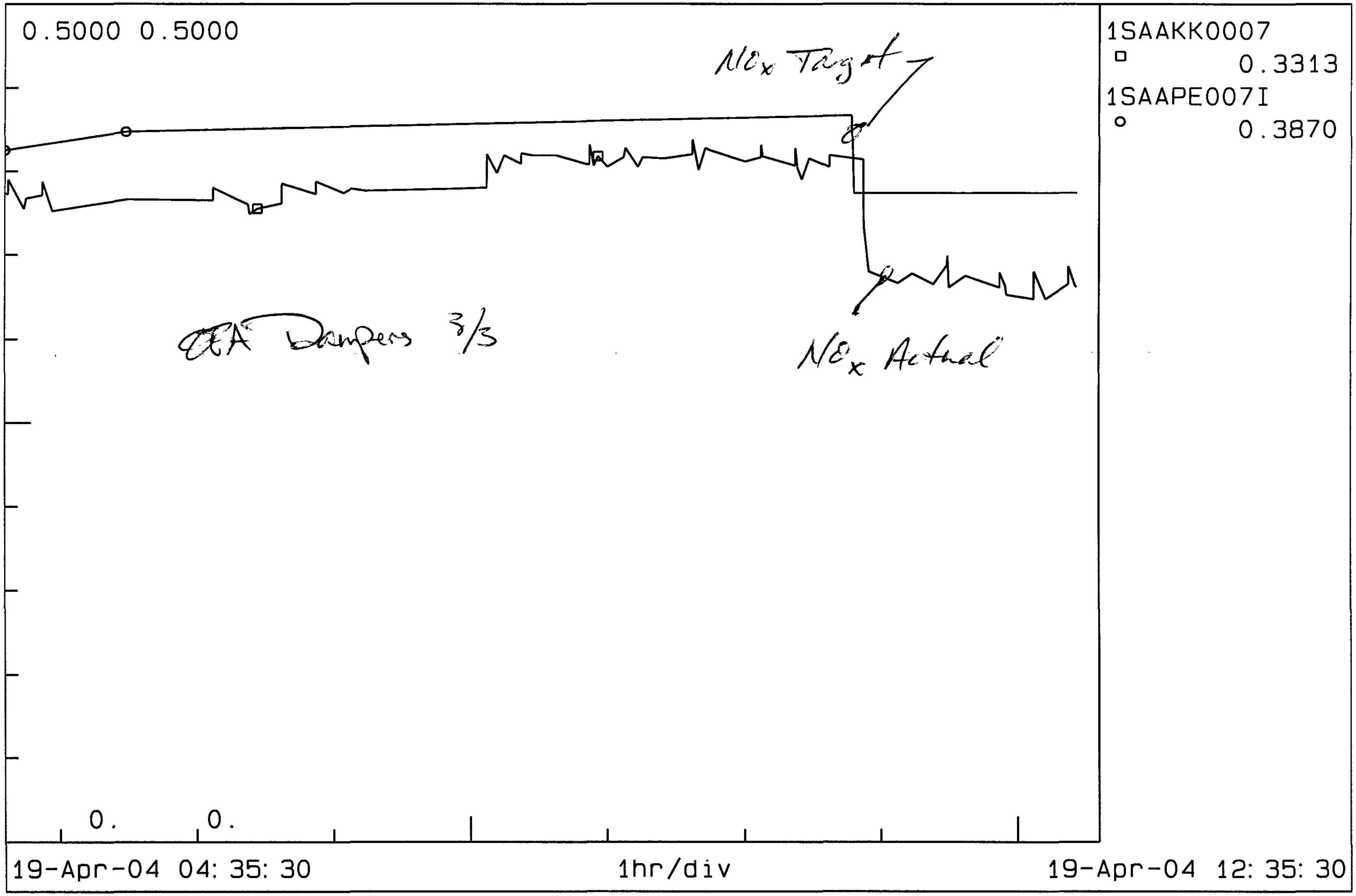
PA Bias	Unit 1	Unit 2
A Pulv	7.4	0.0
B Pulv	0.0	5.4
C Pulv	2.9	0.0
D Pulv	0.0	2.3
E Pulv	3.8	6.6
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	6.0	4.8

EndTim= 19-Apr-04 12:22:56 /EvalTim= 19-Apr-04 12:22:56 /PanRate= 0

IP12_002907

Printed out for: UNIT1OP - 19-Apr-04 12:26:02

0 Messages O2 Data O2 Unit Comparisons 19-Apr-04 12:26:02



EndTim= 19-Apr-04 12:26:02 /EvalTim= 19-Apr-04 12:26:02 /PanRate= 0

IP12_002908

Printed out for: UNIT1OP - 19-Apr-04 12:32:25 SA 400% ⇒ -20% BIAS

0 Messages O2 Data O2 Unit Comparisons 19-Apr-04 12:32:25

Coordinated Control System

Data		Unit 1	Unit 2
Meas'd Load	MW	952.50	899.00
East Probe 1	% O2	2.29	1.88
Probe 2	% O2	2.69	2.38
Probe 3	% O2	2.26	3.40
Probe 4	% O2	2.79	2.56
Average	% O2	2.54	2.37
West Probe 5	% O2	2.21	2.17
Probe 6	% O2	3.20	3.97
Probe 7	% O2	2.74	2.85
Probe 8	% O2	2.44	3.60
Average	% O2	2.58	2.80
Econ O2 Out Average	% O2	2.56	2.54
Econ O2 Out Setpoint	% O2	3.09	3.16
O2 Trim Setpoint		33.1	52.0
Total Air %	5,761,000	78.9	75.2
Coal Flow	TPH	371.6	348.3
# of Pulv In-service		7.	7.
Main Steam Pressure		2405.4	2240.4
Stack NOx	PPM	202.	181.
Scrubber NOx	PPM	225.	200.
Stack Converted NOx	LB/MBTU	0.331	0.309
Target NOx	LB/MBTU	0.386	0.428
Scrubber Inlet SO2	PPM	452.8	397.6
PSH/RH Bias Dmpr Pos		105./ 30.	84./100.
MS/RH Temps		1004.5/1004.3	1000.5/ 994.0

U1	/ U2	
OFA 17%		
% ~~14.5~~	5.6	
Inlets		
SW	99.	BadI
SE	99.	BadI
NW	98.	BadI
NE	99.	BadI
1/3		
SW	97.	BadI
SE	100.	BadI
NW	90.	BadI
NE	99.	BadI
2/3		
SW	98.	BadI
SE	96.	BadI
NW	99.	BadI
NE	99.	BadI
Flow		
SW 266.	81.	
SE 261.	81.	
NW 272.	113.	
NE 250.	106.	
1050.	380.	

1050

SA Damper	Unit 1		Unit 2
Pulv A	57.	A	72.
Pulv B	57.	B	72.
Pulv C	57.	C	53.
Pulv D	57.	D	78.
Pulv E	57.	E	71.
Pulv F	57.	F	69.
Pulv G	20.	G	72.
Pulv H	58.	H	72.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	0.0
D Pulv	0.0	3.7
E Pulv	0.0	-2.1
F Pulv	0.0	-3.5
G Pulv	0.0	0.0
H Pulv	0.0	0.0

PA Bias	Unit 1	Unit 2
A Pulv	7.4	0.0
B Pulv	0.0	5.4
C Pulv	2.9	0.0
D Pulv	0.0	2.3
E Pulv	3.8	6.6
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	6.0	4.8

EndTim= 19-Apr-04 12:32:25 /EvalTim= 19-Apr-04 12:32:25 /PanRate= 0

IP12_002909

Printed out for: UNIT1OP - 16-Apr-04 13:32:45

Not consistent w/ CCS Phil C Hales

0 Messages O2 Data O2 Unit Comparisons 16-Apr-04 13:32:45

Data		Unit 1	Unit 2
Meas'd Load	MW	950.75	903.25
East Probe 1	% O2	2.13	2.25
Probe 2	% O2	2.78	2.86
Probe 3	% O2	2.13	3.84
Probe 4	% O2	3.06	3.22
Average	% O2	2.49	2.88
West Probe 5	% O2	2.50	2.28
Probe 6	% O2	2.72	4.35
Probe 7	% O2	2.68	3.34
Probe 8	% O2	0.36	2.89
Average	% O2	2.45	2.76
Econ O2 Out Average	% O2	2.47	2.78
Econ O2 Out Setpoint	% O2	3.08	3.16
O2 Trim Setpoint		41.7	59.1
Total Air %		81.3	77.9
Coal Flow	TPH	368.4	346.0
# of Pulv In-service		7.	7.
Main Steam Pressure		2392.8	2238.6
Stack NOx	PPM	250.	177.
Scrubber NOx	PPM	268.	195.
Stack Converted NOx	LB/MBTU	0.421	0.311
Target NOx	LB/MBTU	0.391	0.380
Scrubber Inlet SO2	PPM	463.1	430.0
PSH/RH Bias Dmpr Pos		BadI/ 30.	98./ 37.
MS/RH Temps		1005.0/1007.5	1004.5/1006.8

OFA	U1	U2
%	12.7	13.3
Inlets		
SW	99.	99.
SE	99.	99.
NW	98.	98.
NE	99.	99.
1/3		
SW	96.	97.
SE	99.	99.
NW	90.	90.
NE	99.	99.
2/3		
SW	97.	97.
SE	97.	97.
NW	98.	98.
NE	99.	99.
Flow		
SW	231.	231.
SE	215.	216.
NW	257.	257.
NE	236.	233.
	939	937.

SA Damper	Unit 1	Unit 2
Pulv A	74	65.
Pulv B	74	86.
Pulv C	75	62.
Pulv D	74	67.
Pulv E	74	19.
Pulv F	76	65.
Pulv G	10	65.
Pulv H	75	65.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	-4.0
D Pulv	0.0	0.0
E Pulv	0.0	0.0
F Pulv	0.0	-2.1
G Pulv	0.0	0.0
H Pulv	0.0	0.0

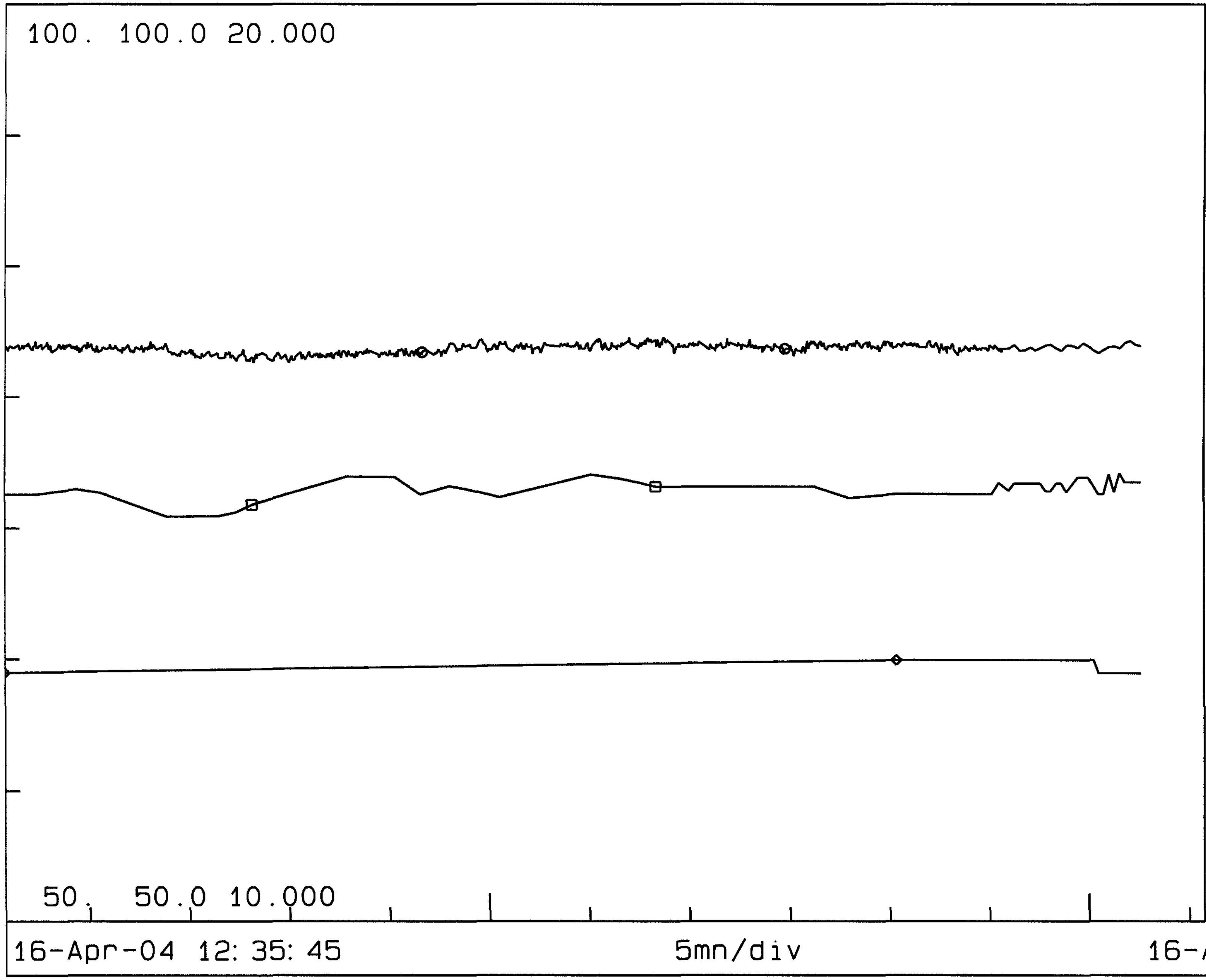
PA Bias	Unit 1	Unit 2
A Pulv	3.5	0.0
B Pulv	0.0	0.0
C Pulv	2.9	5.7
D Pulv	0.0	0.0
E Pulv	3.8	0.0
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	2.4	0.0

EndTim= 16-Apr-04 13:32:45 /EvalTim= 16-Apr-04 13:32:45 /PanRate= 0

IP12_002910

Printed out for: UNIT1OP - 16-Apr-04 13:32:51

0 Messages 02 Data 02 Unit Comparisons 16-Apr-04 13:32:51



1COAKS007A
□ Amillod 74.
1COAXI078S
○ 81.3
1COAXI172B
◇ 12.705

EndTim= 16-Apr-04 13:32:51 /EvalTim= 16-Apr-04 13:32:51 /PanRate= 0

Printed out for: UNIT1OP - 16-Apr-04 13:50:04

0 Messages 02 Data 02 Unit Comparisons 16-Apr-04 13:50:04

Data		Unit 1	Unit 2
Meas'd Load	MW	951.25	904.25
East Probe 1	% 02	1.73	2.80
Probe 2	% 02	2.62	3.17
Probe 3	% 02	2.36	3.27
Probe 4	% 02	3.40	2.57
Average	% 02	2.60	2.88
West Probe 5	% 02	2.18	3.07
Probe 6	% 02	2.33	4.81
Probe 7	% 02	2.58	3.60
Probe 8	% 02	2.16	3.28
Average	% 02	2.39	3.21
Econ 02 Out Average	% 02	2.48	2.99
Econ 02 Out Setpoint	% 02	3.08	3.16
02 Trim Setpoint		41.7	59.1
Total Air %		81.4	77.6
Coal Flow	TPH	368.0	345.6
# of Pulv In-service		7.	7.
Main Steam Pressure		2393.4	2229.0
Stack NOx	PPM	246.	182.
Scrubber NOx	PPM	265.	200.
Stack Converted NOx	LB/MBTU	0.415	0.318
Target NOx	LB/MBTU	0.393	0.380
Scrubber Inlet SO2	PPM	465.0	433.5
PSH/RH Bias Dmpr Pos		BadI/ 30.	98./ 38.
MS/RH Temps		1008.1/1010.4	1007.4/1008.3

	U1	U2
OFA		
%	12.7	13.4
Inlets		
SW	99.	99.
SE	99.	99.
NW	98.	98.
NE	99.	99.
1/3		
SW	96.	97.
SE	99.	99.
NW	90.	90.
NE	99.	99.
2/3		
SW	97.	97.
SE	97.	97.
NW	98.	98.
NE	99.	99.
Flow		
SW	234.	231.
SE	220.	216.
NW	253.	257.
NE	238.	233.
	945.	937.

SA Damper	Unit 1		Unit 2
Pulv A	65.	A	67.
Pulv B	75.	B	86.
Pulv C	65	C	64.
Pulv D	76.	D	68.
Pulv E	75.	E	19.
Pulv F	66	F	66.
Pulv G	10.	G	67.
Pulv H	70	H	66.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	-4.0
D Pulv	0.0	0.0
E Pulv	0.0	0.0
F Pulv	0.0	-2.1
G Pulv	0.0	0.0
H Pulv	0.0	0.0

PA Bias	Unit 1	Unit 2
A Pulv	3.5	0.0
B Pulv	0.0	0.0
C Pulv	2.9	5.7
D Pulv	0.0	0.0
E Pulv	3.8	0.0
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	2.4	0.0

EndTim= 16-Apr-04 13:50:04 /EvalTim= 16-Apr-04 13:50:04 /PanRate= 0

IP12_002912

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Printed out for: UNIT1OP            - 16-Apr-04 13:53:18
 0 Messages O2 Data    O2 Unit Comparisons                  16-Apr-04 13:53:18

 Data                              Unit 1      Unit 2      U1    U2 SA DamperUnit 1 Unit 2
 Meas'd Load         MW            951.25      901.00     OFA          Pulv  A  70. A  67.
 East  Probe 1       % O2            2.00        3.42    % 13.0 13.0 Pulv  B  73. B  85.
      Probe 2        % O2            2.54        3.85     Inlets       Pulv  C  70. C  64.
      Probe 3        % O2            2.19        4.03    SW  99.   99. Pulv  D  73. D  68.
      Probe 4        % O2            3.05        3.01    SE  99.   99. Pulv  E  73. E  19.
      Average        % O2            2.48        3.45    NW  98.   98. Pulv  F  70. F  66.
 West  Probe 5       % O2            2.41        2.64    NE  99.   99. Pulv  G  10. G  67.
      Probe 6        % O2            2.46        4.43     1/3          Pulv  H  70. H  67.
      Probe 7        % O2            2.53        3.68    SW  96.   97.
      Probe 8        % O2            2.20        4.14    SE  99.   99. Coal Bias  U1     U2
      Average        % O2            2.40        3.24    NW  90.   90.  A Pulv    0.0    0.0
                                                         NE  99.   99.  B Pulv    0.0    0.0
 Econ O2 Out Average% O2             2.46        3.36     2/3           C Pulv    0.0   -4.0
 Econ O2 Out Setpoint% O2            3.09        3.16    SW  97.   97.  D Pulv    0.0    0.0
 O2 Trim Setpoint                    41.7        59.1    SE  97.   97.  E Pulv    0.0    0.0
 Total Air %                         81.5        77.3    NW  98.   98.  F Pulv    0.0   -2.1
                                                         NE  99.   99.  G Pulv    0.0    0.0
 Coal Flow           TPH            368.7       343.0     Flow          H Pulv    0.0    0.0
 # of Pulv In-service                  7.          7.
 Main Steam Pressure               2397.0      2229.6    SW 225.  231.PA Bias Unit 1 Unit 2
 Stack NOx           PPM             245.        182.    SE 220.  216.  A Pulv    3.5    0.0
 Scrubber NOx        PPM             260.        200.    NW 263.  257.  B Pulv    0.0    0.0
 Stack Converted NOx LB/MBTU        0.413       0.312    NE 238.  233.  C Pulv    2.9    5.7
 Target NOx          LB/MBTU        0.392       0.380      946.  937.   D Pulv    0.0    0.0
 Scrubber Inlet SO2  PPM            462.8       433.5                   E Pulv    3.8    0.0
                                                                        F Pulv    3.0    9.0
 PSH/RH Bias Dmpr Pos      BadI/ 30.    98./ 38.                        G Pulv    0.1    0.0
 MS/RH Temps          1008.6/1011.5 1003.7/1008.0                       H Pulv    2.4    0.0

EndTim= 16-Apr-04 13:53:18 /EvalTim= 16-Apr-04 13:53:18 /PanRate= 0
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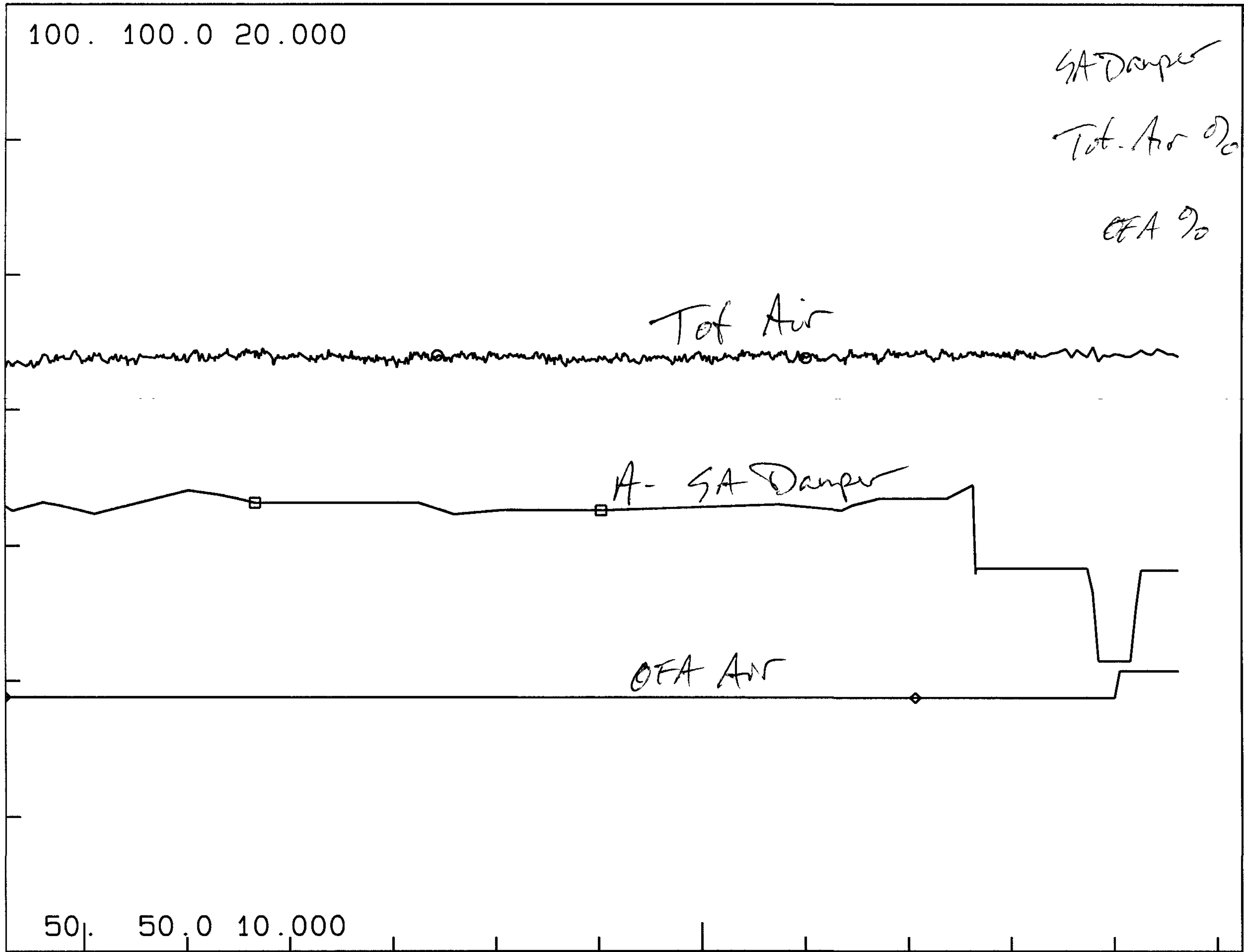
IP12_002913

Printed out for: UNIT1OP - 16-Apr-04 13:54:53

0 Messages 02 Data 02 Unit Comparisons 16-Apr-04 13:54:53



1COAKS007A A only 70.

1COAXI078S 81.4

1COAXI172B 12.960

16-Apr-04 12:56:11 5mn/div 16-Apr-04 13:56:11

EndTim= 16-Apr-04 13:54:53 /EvalTim= 16-Apr-04 13:54:53 /PanRate= 0

IP12_002914

Printed out for: UNIT1OP - 16-Apr-04 14:01:15

0 Messages U1 Pulv 2 Unit 1 Pulv data 16-Apr-04 14:01:15

Unit 1 950.5 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Burner Location	3rd row Front	1st row Front	2nd row Rear	4th row Rear	4th row Front	2nd row Front	1st row Rear	3rd row Rear
Pulv Status	ON	ON	ON	ON	ON	ON	OFF	ON
Feeder Speed	76.6	75.2	76.9	75.9	74.6	77.0	Calc	78.6
Amps	55.0	61.0	62.4	63.2	58.0	48.5	0.0	58.5
Stator Temp (C)	97.4	93.4	127.	113.	107.	71.4	25.1	116.
Mtr Brg Temp-IB	159.	161.	176.	156.	160.	147.	79.5	135.
Mtr Brg Temp-OB	125.	142.	149.	137.	150.	138.	78.7	146.
Rotating Throat			Tech		BPI		Alstom	B&W
Backplate Ave T	951.	839.	874.	959.	966.	897.	1063.	946.
SA Damper Pos	65.2	69.8	64.9	69.9	69.9	65.1	10.0	65.1
SA Windbox Press	1.6	1.4	1.3	1.5	1.5	1.6	0.0	0.8
Coal Pipe Ave T	634.	619.	526.	635.	642.	637.	774.	621.

EndTim= 16-Apr-04 14:01:15 /EvalTim= 16-Apr-04 14:01:15 /PanRate= 0

IP12_002915

Pr`inted out for: UNIT1OP - 16-Apr-04 14:33:06

0 Messages O2 Data O2 Unit Comparisons 16-Apr-04 14:33:06

Data		Unit 1	Unit 2
Meas'd Load	MW	951.25	902.25
East Probe 1	% O2	1.81	2.49
Probe 2	% O2	2.47	3.10
Probe 3	% O2	2.43	2.71
Probe 4	% O2	3.20	0.94
Average	% O2	2.52	2.10
West Probe 5	% O2	2.33	2.19
Probe 6	% O2	2.41	4.21
Probe 7	% O2	2.29	3.86
Probe 8	% O2	1.91	3.86
Average	% O2	2.25	3.16
Econ O2 Out Average	% O2	2.40	2.67
Econ O2 Out Setpoint	% O2	3.08	3.16
O2 Trim Setpoint		41.7	59.1
Total Air %		81.3	78.3
Coal Flow	TPH	370.0	344.9
# of Pulv In-service		7.	7.
Main Steam Pressure		2389.8	2206.8
Stack NOx	PPM	236.	186.
Scrubber NOx	PPM	258.	186.
Stack Converted NOx	LB/MBTU	0.399	0.318
Target NOx	LB/MBTU	0.394	0.380
Scrubber Inlet SO2	PPM	474.7	433.5
PSH/RH Bias Dmpr Pos		BadI/ 45.	98./ 70.
MS/RH Temps		1000.0/ 990.0	1002.5/ 994.3

	U1	U2
OFA		
%	12.9	13.3
Inlets		
SW	99.	99.
SE	99.	99.
NW	98.	98.
NE	99.	99.
1/3		
SW	96.	97.
SE	99.	99.
NW	90.	90.
NE	99.	99.
2/3		
SW	97.	97.
SE	97.	97.
NW	98.	98.
NE	99.	99.
Flow		
SW	231.	231.
SE	226.	216.
NW	263.	257.
NE	241.	233.
	962.	937.

SA Damper		Unit 1		Unit 2
Pulv	A	60	A	84.
Pulv	B	73.	B	29.
Pulv	C	60	C	83.
Pulv	D	73.	D	86.
Pulv	E	73.	E	19.
Pulv	F	60	F	82.
Pulv	G	10.	G	84.
Pulv	H	60.	H	84.

Coal Bias	U1	U2
A Pulv	0.0	0.0
B Pulv	0.0	0.0
C Pulv	0.0	-4.0
D Pulv	0.0	0.0
E Pulv	0.0	0.0
F Pulv	0.0	-4.2
G Pulv	0.0	0.0
H Pulv	0.0	0.0

PA Bias	Unit 1	Unit 2
A Pulv	2.7	0.0
B Pulv	0.0	0.0
C Pulv	2.9	5.7
D Pulv	0.0	0.0
E Pulv	3.8	0.0
F Pulv	3.0	9.0
G Pulv	0.1	0.0
H Pulv	2.4	0.0

EndTim= 16-Apr-04 14:33:06 /EvalTim= 16-Apr-04 14:33:06 /PanRate= 0

IP12_002916

Printed out for: UNIT1OP - 16-Apr-04 14:33:19
0 Messages U1 Pulv 2 Unit 1 Pulv data 16-Apr-04 14:33:19

Unit 1 952.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Burner Location	3rd row Front	1st row Front	2nd row Rear	4th row Rear	4th row Front	2nd row Front	1st row Rear	3rd row Rear
Pulv Status	ON	ON	ON	ON	ON	ON	OFF	ON
Feeder Speed	76.8	80.0	77.8	77.8	76.7	75.3	Calc	77.4
Amps	55.0	57.7	68.2	66.4	57.9	46.7	0.0	61.0
Stator Temp (C)	97.4	93.6	127.	114.	107.	71.4	25.1	116.
Mtr Brg Temp-IB	159.	161.	177.	156.	161.	147.	79.5	135.
Mtr Brg Temp-OB	125.	142.	149.	137.	151.	138.	78.7	146.
Rotating Throat			Tech		BPI		Alstom	B&W
Backplate Ave T	945.	832.	874.	953.	960.	896.	1051.	943.
SA Damper Pos	60.0	74.1	60.0	74.0	74.2	60.0	10.0	60.1
SA Windbox Press	1.7	1.8	1.2	1.8	1.9	1.8	0.0	0.9
Coal Pipe Ave T	630.	618.	523.	632.	639.	634.	769.	617.

EndTim= 16-Apr-04 14:33:19 /EvalTim= 16-Apr-04 14:33:19 /PanRate= 0

IP12_002917

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Printed out for:  UNIT1OP            - 16-Apr-04 14:45:34
  0 Messages O2 Data    O2 Unit Comparisons                     16-Apr-04 14:45:34

 Data                               Unit 1     Unit 2    U1    U2 SA DamperUnit 1 Unit 2
 Meas'd Load          MW           949.25     907.25    OFA         Pulv  A  60.  A  58.
 East   Probe 1       % O2           2.64       2.83   % 13.0 12.8 Pulv  B  76.  B  56.
       Probe 2        % O2           3.05       3.10    Inlets      Pulv  C  60.  C  56.
       Probe 3        % O2           2.64       3.55   SW 99.   99. Pulv  D  76.  D  60.
       Probe 4        % O2           3.39       2.58   SE 99.   99. Pulv  E  76.  E  19.
       Average        % O2           2.94       2.82   NW 98.   98. Pulv  F  60.  F  55.
 West   Probe 5       % O2           2.54       2.74   NE 99.   99. Pulv  G  10.  G  59.
       Probe 6        % O2           2.57       3.99    1/3         Pulv  H  60.  H  58.
       Probe 7        % O2           2.54       3.34   SW 96.   97.
       Probe 8        % O2           2.23       3.21   SE 99.   99.Coal Bias U1      U2
       Average        % O2           2.53       2.97   NW 90.   90. A Pulv   0.0     0.0
                                                       NE 99.   99. B Pulv   0.0     0.0
 Econ O2 Out Average% O2             2.73       2.94    2/3         C Pulv   0.0    -4.0
 Econ O2 Out Setpoint% O2            3.08       3.16   SW 97.   97. D Pulv   0.0     0.0
 O2 Trim Setpoint                    44.8       59.1   SE 97.   97. E Pulv   0.0     0.0
 Total Air %                         83.6       78.9   NW 98.   98. F Pulv   0.0    -5.0
 Coal Flow            TPH           371.1      345.0   NE 99.   99. G Pulv   0.0     0.0
 # of Pulv In-service                  7.         7.    Flow        H Pulv   0.0     0.0
 Main Steam Pressure               2395.8     2286.6   SW 239. 231.PA Bias Unit 1 Unit 2
 Stack NOx            PPM           246.       169.    SE 234. 216. A Pulv   2.7     0.0
 Scrubber NOx         PPM           266.       188.    NW 272. 257. B Pulv   0.0     4.2
 Stack Converted NOxLB/MBTU         0.423      0.295   NE 251. 233. C Pulv   2.9     5.7
 Target NOx          LB/MBTU        0.395      0.378     995   937. D Pulv   0.0     4.1
 Scrubber Inlet SO2  PPM            461.9      428.6                E Pulv   3.8     0.0
 PSH/RH Bias Dmpr Pos       BadI/ 60.   98./ 76.                    F Pulv   3.0     9.0
                                                                    G Pulv   0.1     0.0
 MS/RH Temps        1005.0/1004.7 1019.5/1010.4                     H Pulv   2.4     0.0
EndTim= 16-Apr-04 14:45:34 /EvalTim= 16-Apr-04 14:45:34 /PanRate= 0
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Printed out for: UNIT1OP - 16-Apr-04 14:45:45
0 Messages U1 Pulv 2 Unit 1 Pulv data 16-Apr-04 14:45:45

Unit 1 949.3 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Burner Location	3rd row Front	1st row Front	2nd row Rear	4th row Rear	4th row Front	2nd row Front	1st row Rear	3rd row Rear
Pulv Status	ON	ON	ON	ON	ON	ON	OFF	ON
Feeder Speed	76.4	78.8	76.1	80.4	78.5	76.7	Calc	78.3
Amps	53.2	60.2	65.5	64.9	60.7	47.7	0.0	56.9
Stator Temp (C)	97.6	93.8	128.	114.	107.	71.6	25.1	116.
Mtr Brg Temp-IB	159.	161.	177.	156.	161.	148.	80.1	136.
Mtr Brg Temp-OB	126.	143.	150.	138.	151.	139.	79.2	146.
Rotating Throat			Tech		BPI		Alstom	B&W
Backplate Ave T	940.	826.	868.	945.	954.	890.	1049.	935.
SA Damper Pos	60.0	75.7	60.0	75.9	75.8	60.0	10.0	60.1
SA Windbox Press	1.9	2.1	1.4	2.1	2.1	2.0	0.0	1.0
Coal Pipe Ave T	627.	615.	520.	629.	636.	630.	765.	614.

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2/3 Closed 1/3 Open

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Printed out for:  UNIT1OP              - 16-Apr-04 15:12:58
  0 Messages O2 Data    O2 Unit Comparisons                       16-Apr-04 15:12:58

 Data                              Unit 1     Unit 2     U1    U2 SA DamperUnit 1 Unit 2
 Meas'd Load         MW            948.75     904.50     OFA         Pulv  A 60.  A  72.
 East   Probe 1      % O2            1.72       3.10     %  9.4 13.9 Pulv  B 74.  B  41.
        Probe 2      % O2            2.39       3.14      Inlets     Pulv  C 60.  C  69.
        Probe 3      % O2            3.21       3.21     SW  99.   99. Pulv  D 74.  D  74.
        Probe 4      % O2            4.20       1.97     SE  99.   99. Pulv  E 74.  E  19.
        Average      % O2            2.95       2.67     NW  98.   98. Pulv  F 60.  F  67.
 West   Probe 5      % O2            3.17       1.94     NE  99.   99. Pulv  G 10.  G  73.
        Probe 6      % O2            3.16       4.16      1/3        Pulv  H 60.  H  72.
        Probe 7      % O2            3.10       3.50     SW  96.   97.
        Probe 8      % O2            3.47       3.28     SE  99.   99.Coal Bias U1     U2
        Average      % O2            3.22       2.76     NW  90.   90. A Pulv   0.0    0.0
                                                         NE  99.   99. B Pulv   0.0    0.0
 Econ O2 Out Average% O2             3.09       2.76      2/3          C Pulv   0.0   -4.0
 Econ O2 Out Setpoint% O2            3.08       3.16     SW   0.   97. D Pulv   0.0    0.0
                                                         SE   0.   97. E Pulv   0.0    0.0
 O2 Trim Setpoint                    44.8       59.1     NW   0.   98. F Pulv   0.0   -5.0
 Total Air %                         83.0       78.3     NE   0.   99. G Pulv   0.0    0.0
                                                                       H Pulv   0.0    0.0
 Coal Flow           TPH            366.9      348.3      Flow
 # of Pulv In-service                  7.         7.     SW 175.  231.PA Bias Unit 1 Unit 2
 Main Steam Pressure               2406.6     2248.8     SE 163.  216. A Pulv   2.7    0.0
 Stack NOx           PPM             276.       166.     NW 168.  257. B Pulv   0.0    0.0
 Scrubber NOx        PPM             294.       181.     NE 170.  233. C Pulv   2.9    5.7
 Stack Converted NOxLB/MBTU         0.472      0.286        686.       D Pulv   0.0    4.1
 Target NOx          LB/MBTU        0.396      0.380                   E Pulv   3.8    0.0
 Scrubber Inlet SO2 PPM             466.3      444.3                   F Pulv   3.0    9.0
                                                                       G Pulv   0.1    0.0
 PSH/RH Bias Dmpr Pos       BadI/ 51.    98./ 84.                      H Pulv   2.4    0.0

 MS/RH Temps          1003.3/1005.2 1017.5/1008.6

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Printed out for: UNIT1OP - 16-Apr-04 15:13:03
0 Messages U1 Pulv 2 Unit 1 Pulv data 16-Apr-04 15:13:03

Unit 1 948.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Burner Location	3rd row Front	1st row Front	2nd row Rear	4th row Rear	4th row Front	2nd row Front	1st row Rear	3rd row Rear
Pulv Status	ON	ON	ON	ON	ON	ON	OFF	ON
Feeder Speed	76.0	79.4	76.5	77.8	76.8	76.3	Calc	78.6
Amps	55.0	56.9	65.2	62.7	60.7	48.2	0.0	58.0
Stator Temp (C)	98.0	94.2	128.	114.	108.	71.6	25.1	116.
Mtr Brg Temp-IB	160.	162.	178.	157.	161.	148.	80.1	136.
Mtr Brg Temp-OB	126.	143.	150.	138.	151.	139.	79.5	147.
Rotating Throat			Tech		BPI		Alstom	B&W
Backplate Ave T	935.	821.	856.	933.	942.	881.	1034.	925.
SA Damper Pos	60.0	73.7	60.0	73.9	73.8	60.0	10.0	60.1
SA Windbox Press	2.3	2.4	1.8	2.5	2.4	2.4	0.0	1.2
Coal Pipe Ave T	627.	614.	521.	628.	635.	630.	756.	613.

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IP12_002921

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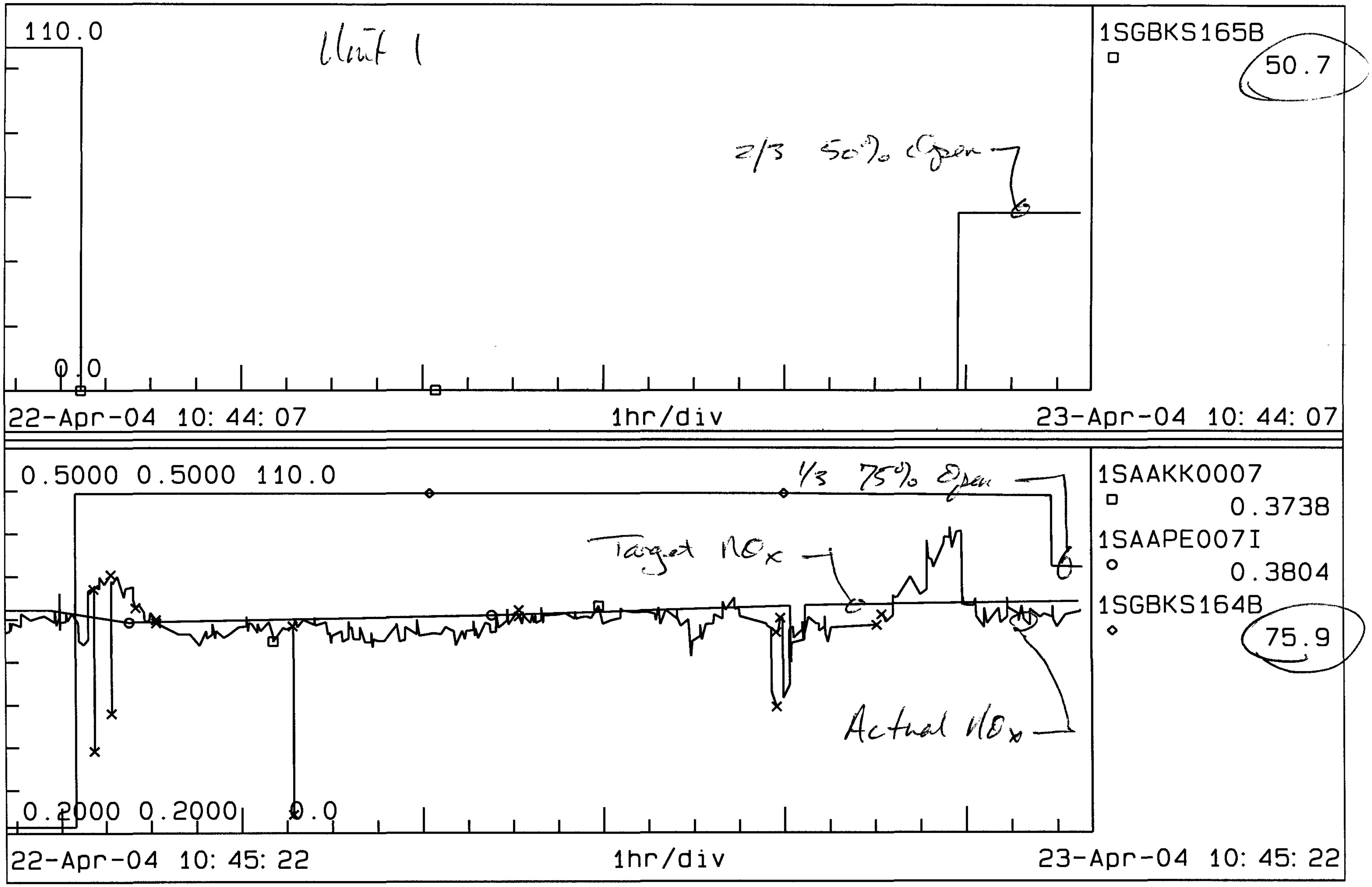

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IP12_002922

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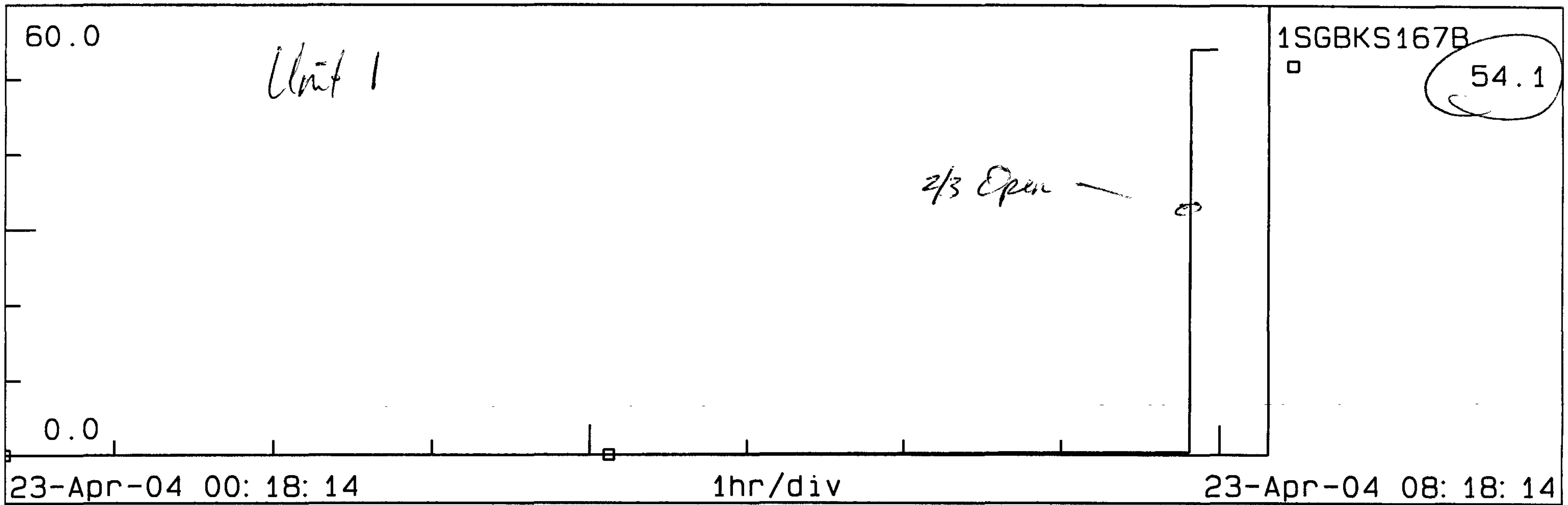

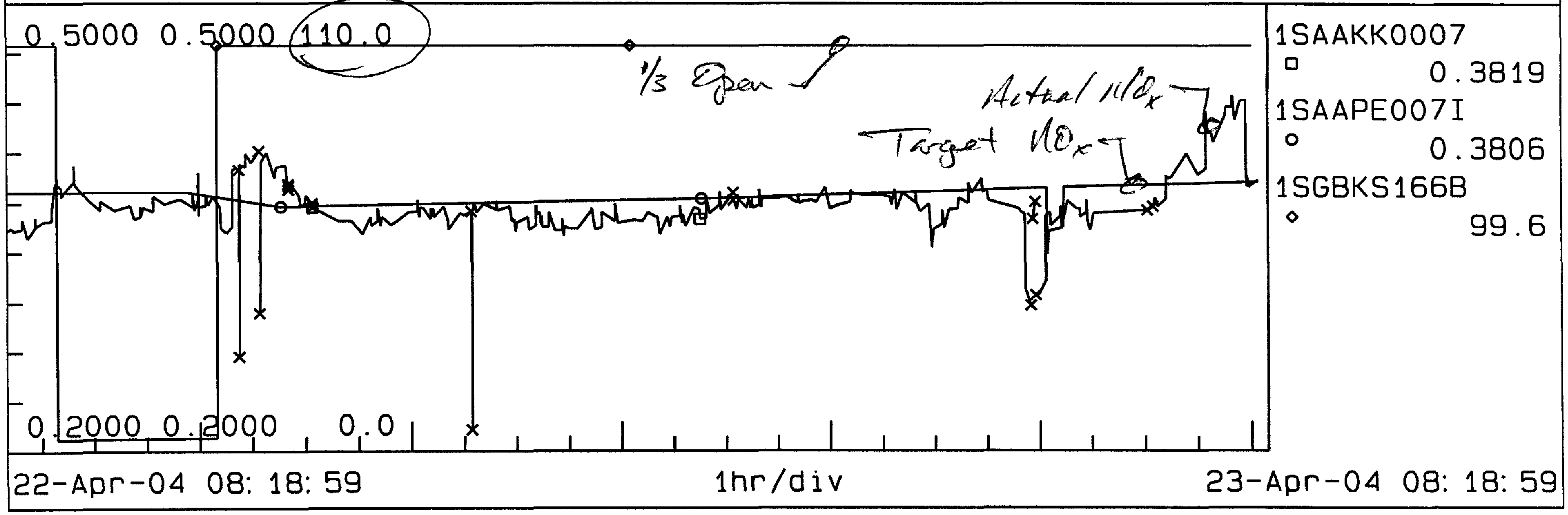

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IP12_002923

I knew I would forget something. When the outlet temperature setpoint is raised, the standards allow the higher outlet temperature to "correct" the primary air flow by reducing the mass flow. For the difference in 150 ^{0}F to 175 ^{0}F, the required primary air flow is reduced by some 7.8%, which may be appealing to the plant.

Sorry about the omission.

My initial review of the recent performance of 1G mill is as follows:

1. In February 2004, the customer sent us operating data on the mills for the purpose of sizing the rotating throat. At that time, we noted that the data showed the primary air flow to be 2.7% below the required value at 50 TPH of 40 HGI coal flow, which was noted as the lowest grindability range. We recommended to them to raise the primary air flow at given coal flows to provide adequate primary air flow.

2. From their August 3 2004 data, it appears as if the primary air flow is still lower than required, but better than the values listed in February. The August 3rd 80.3 % feeder speed (54.2 TPH) load point shown for 1G mill at 0800 hours shows the primary air flow to be 3637 lb/min. This value is only 1% below the required primary air flow for an assumed 40 HGI coal flow of 54.2 TPH. Their graphical view of the 0800 hours 1G mill performance showed that the mill differential was stable but higher than expected. **This higher mill differential is partially due to the lower than required primary air flow, no inlet conditioning (no inlet cones on the rotating throat), and inadequate roll wheel loading pressure.** Note that the mill inlet temperature is only 310 ^{0}F with a mill outlet setpoint of 150 ^{0}F. This means that there is a large amount of tempering air being used to reduce the available primary air heater outlet temperature to the mill inlet temperature as shown. In many instances, this ends up forcing the majority of the primary air flow demand through the tempering air duct, which is smaller than the hot air duct. There is no current operating data that shows what position the tempering air and hot air dampers are in, but chances are the tempering air damper is a lot further open than the hot air damper. Putting the majority of air flow through the tempering air duct can cause restrictions in flow for the given primary air static pressure. (Incidentally, based on an assumed 40 HGI coal with 54.2 TPH through put and assumed 70% fineness, the existing B&W 89G would be operating at 99.2 % of its capability at this coal flow). Furthermore, for this high output ratio, we require the roll wheel loading to essentially be 100%, or 2394 psig (the system was originally designed to provide 2400 psig hydraulic pressure, equating to approximately 28 tons per roll wheel loading pressure). **As seen from the data, the loading pressure feedback is 2137 psig, which is approximately 11% lower than desired. As a side note, current standard variable loading systems are designed to provide 3000 psig hydraulic loading pressure, equating to 35 tons per roll wheel loading.**

3. During the pulverizer upgrade discussions with BWSC Projects in 1998, we recommended that the original hydraulic pump (and possibly the motor) be replaced to deliver the higher loading. Since the mills are being operated at very high corrected coal flows, this higher roll wheel loading capability is once again recommended.

4. We have previously shown during our 1998 tests that primary air duct pressure setpoint has a dramatic affect on the primary air system delivery, and on mill differential. During these 1998 tests on mill 2H, we raised the duct pressure from 45.7" w.c. to 48.2" w.c. while maintaining a constant 70% feeder speed on mill 2H. The 2H primary air flow damper decreased from 83.6% open to 79.6% open, and 2H mill differential dropped from 23.5 " w.c. to 20.5 " w.c.. Therefore, **raising the duct pressure to allow adequate primary air flow is very important, especially since a lot of the primary air is going through the smaller tempering air duct.**

5. In relation to the apparent very low coal moisture requiring very large amounts of tempering air, **it would benefit the plant if they raised the mill outlet temperature setpoint to either 170 or 175 ^{0}F to reduce the amount of required tempering air and capture back some of the damper position.** This also increases unit efficiency, since more hot air is being used from the air heater, and would reduce the strain on the primary air delivery system by allowing more air to flow through the larger hot air ducts.

6. The graphical data shown for mill 1G from 80% to 85% feeder speed shows that for that increase in feeder speed, there was a corresponding increase in primary air flow and mill differential, with all parameters appearing to be stable. For a 40 HGI coal flow and 70% fineness, the mill would be operating at 105.5 % of its possible capacity.

7. The graphical data shown for mill 1G from 85% to 90% feeder speed shows that for that increase in feeder speed, there was a corresponding decrease in primary air flow. This is an obvious indication that for those conditions of primary air delivery pressure, percentage of tempering and hot air, and system resistance, the primary air delivery and hydraulic loading pressure to 1G mill was inadequate. Both of these deficiencies have a detrimental effect on mill differential and stability. I took the liberty of trying to proportion the graphical primary air flow for the 90% feeder speed from other control room data, and came up with a primary air flow of somewhere around 3540 lb/min, which is approximately 10% deficient for this coal flow with an assumed 40 HGI value. Even with this air flow and loading pressure deficiency, the mill differential was stable (but higher than expected), possibly indicating a preliminary condition of starvation and subsequent choking. For this 90 % feeder speed, the mill would be operating at 111.5% of its possible capacity if the raw feed is 40 HGI.

8. The graphical data shown for mill 1G from 90% to 95% feeder speed shows that **for that additional increase in feeder speed, there was a large decrease in primary air flow, with values reaching as low as 3252 lb/min, which is approximately 20% below the required primary air flow. Once again, if we assume the 40 HGI coal at this flow, the mill is operating at 118% of 50 HGI coal flow. This serves as a more obvious indication that for the conditions of primary air delivery pressure, percentage of tempering and hot air, and system resistance, the primary air delivery and hydraulic loading pressure to 1G mill was inadequate. Both of these deficiencies have a detrimental effect on mill differential and stability**. I agree that for these conditions the mill was in a choking condition, indicative by a large increase in mill differential. The customer does not state whether or not the mill was rejecting at this condition, but if it wasn't, I would expect that eventually it may have started if the mill differential would not eventually stabilize.

9. I also agree that the mill differential was much higher than expected. However, inadequate primary air delivery pressure and/or flow, inadequate loading pressure, high perceived mill output ratios and the absence of inlet conditioning entering the throat will all contribute to this high mill differential. Next week, we should learn what the fineness was on the mill to give us an indication of how much circulating load there may be in the mill, which also affects total mill differential.

10. It would also be nice to look at clean air data to see if there is anything apparently wrong with the clean air side of total mill differential, but for now I guess I can live without it, since there are numerous parametric deficiencies as shown in the operating data.

11. Furthermore, we may ask the customer to run comparison tests on adjacent mills while set up with the same air to fuel ratio, loading pressure, coal throughput, and classifier position. Obviously, any indication of mill rejects would skew this set up, and would make the comparison test coal flow be lower to simulate no rejects on the compared mills.

12. My review of our 1998 testing showed that with low speed on the primary air fans, we were capable of

delivering 48" of PA duct pressure. It would be interesting to know the mill performance when the tests from 0800 hours to 1326 hours are repeated, but starting out with the higher PA duct pressure.

To summarize, **we agree that the mill differential is higher than expected. Certainly, some of this excessive pressure drop is the result of inadequate primary air delivery/flow, hydraulic loading pressure, and the lack of inlet cones at the inlet to the rotating throat. However, clean air conditions, operating positions of the hot and cold dampers, raw coal quality and product fineness all have an affect on operating mill differential. In any event, immediate improvements could be seen from raising the mill outlet temperature setpoint, hydraulic loading pressure, and the primary air duct pressure setpoint. Side by side testing of adjacent mills with identical air to fuel ratios, loading pressure, raw feed, raw coal quality, rejects and fineness will be the best comparison for how well the mill is performing.**

Please advise if anyone has any questions or additions.

Last week you asked if we had heard whether this customer had completed the installation of the Cast Low Pressure Drop Rotating Throat assembly supplied on B&W Order BA9077415. And if the throat installation was complete, you asked if we had heard anything with regards to its performance.

Yesterday I received a call from Alan Dewsnup advising that the throat had been in operation in Unit #1 G Mill for approximately 2 weeks. He said that from a maintenance standpoint, he was very pleased with the way the throat was installed, as well as with the finished product. Unfortunately, the plant personnel more concerned with performance are somewhat disappointed with our throat. He indicated that pulverizer pressure drop was excessive, and that when feeder speed was increased to 95%, the mill began to choke. He didn't have any other specifics. Alan asked if the port area of our throat was the largest we had available. I advised that the supplied throat is referred to as our "Large" port throat, and that an "Extra Large" port throat having an approximate 10% larger port area has been designed. He asked that I call Phil Hailes to obtain more specifics.

Large $5.2 ft^2$
X-Large $5.75 ft^2$

I conveyed the above info to Dan

In the meantime I received the following note from Phil Hailes advising that with a PA supply duct pressure of 44 in. wc., Unit #1 G Mill pressure drop was 19 in. wc. @ 75% feeder speed and 25 in. wc. at 90% feeder speed.

Last evening Dan Menster and I called Phil Hailes to obtain additional info.

Phil advised that at around 7 - 80% feeder speed, G mill pressure drop was higher than all other mills on Unit #1 operating at approximately the same feeder speed. He indicated that when feeder speed was increased to around 90%, G mill pressure drop was comparable to the pressure drop of the other mills operating at the same feeder speed. The customer thought it was odd that the pressure drop in G mill did NOT increase as much as it did in the other mills when feeder speed was increased from 75% to 90%. He then indicated that at 95% feeder speed, G mill began to choke as evidenced by the increase in mill pressure drop and the decrease in air flow. The customer indicated that he did not have any fineness info for G mill to pass along at this time.

The customer is wondering if a larger port throat would reduce pressure drop. In fact, the customer is wondering that knowing what we know now, based on what we were told during the phone conversation, would we supply a larger port throat using the same customer supplied operating data that was originally used to determine the supplied port area.

The customer did say that they encountered a choking problem with a Techinomics rotating throat around 85% feeder speed. An increase in port area of approximately 10% with the competitor's throat had a positive effect with regards to choking, the customer now wonders if increasing the port area of our throat would reduce pressure drop at 75% feeder speed, as well as allow him to operate the mill at 95% feeder speed without choking.

After Dan & I talked to the customer, the customer forwarded the attached "snap shot" of operating data for the Unit #1 mills while operating with a PA duct supply pressure of 44 in. wc. The data does indicate that the Cast Low Pressure Drop throat in G mill is operating at 19.5 in. wc. At 80% feeder speed, or 4 in. wc. higher than H mill in which is installed our weldment design rotating throat with a CW vane orientation. H mill is running with approximately 7% higher air flow than that of G mill.

One thing I noticed is that C, E, F & H mill all operate at 99% air flow at 80% feeder speed, while mills A, B & G mill operate at 91 - 92% feeder speed. I would suspect that mill C, E, F & H would increase in mill pressure drop at a faster rate going from 80 - 90% feeder speed than would mill A, B & G since there would be no increase in air flow in these mills from that which exists at 80% coal flow.

I know that this plant tends to operate with a marginal PA duct supply pressure. If I recall correctly, a mill that had been choking, ceased choking just by increasing the supply duct pressure. This was something that was pointed out to the customer during tests that were performed by Pulverizer Design several years ago.

H mill is operating with any where from 8F - 30F higher inlet air temperature than the other mills which would indicate that it is being operated with less air flow than the other mills.

The H mill motor amps is lower than that which exists in the other mills. I would think that this would be due in part to the likelihood that the mill was overhauled with new grinding elements when the throat was installed.

The customer advised that he will have fineness figures available this coming Monday. He also said that he would like to have further discussions with us early next week, Monday if possible, regarding the higher than expected pressure drop.

I would appreciate it if you would review the customer supplied data.

As you know, this particular throat assembly was supplied without inlet cones. I know you didn't agree with my recommendation to eliminate the inlet cones from the standard throat offering. If we have to go back and supply inlet cones, we will do so. But if I am not mistaken, the feeling was that eliminating the cones might result in an increase in pressure drop of 1 - 2 in. wc., and since the Intermountain mills have large volume primary air chambers, the effect of eliminating the cones may not be that noticeable.

Can you think of any reasons why the pressure drop with our Cast Low Pressure Drop throat seems to be as high as indicated?

I have some data from a test that we ran on the B&W rotating throat

that was recently installed in one of our mills. On Monday, when I return and we have some additional fineness data, I would like to fax a sampling of the data to you for comment.

The significant issue that I would like to discuss is the relatively high level of Diff Press that is being measured (approx 19" WC @ 75% Feeder Speed and rises to 25" WC @ 90% feeder speed and 44" WC of duct pressure).

This leads to my question as to whether B&W would consider our performance levels to be representative of your throats, or if you would recommend a different size/design of throat.

Again, I'll forward some data to you on Monday.

1G B&W Rotating Throat

Printed out for: PHIL-H - 04-Aug-04 15:32:28
0 Messages U1 Pulv U1 Pulv Operating data 04-Aug-04 15:32:28

Unit 1 941.5 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow358.2TPH	53.2	55.4	39.7	0.0	53.7	51.9	53.7	51.7
Feeder Speed	77.3	80.8	58.1	0.0	78.6	75.1	80.6	76.6
Amps (Duct Pr47.6)	60.5	65.4	56.5	0.0	69.0	52.5	48.9	68.5
Coal Pipe Vel	4288.	4002.	3637.	5.	4360.	4414.	4025.	4328.
PA Flow %	96.1	90.3	87.7	0.1	98.0	99.9	90.3	97.9
PA Damper Pos	81.5	79.4	64.9	0.0	87.6	90.9	79.8	85.0
SA Damper Pos	74.5	74.6	53.1	10.0	74.8	72.9	74.3	67.5
PA Mass Flow	3823.	3565.	3462.	5.	3879.	3927.	3587.	3878.
Pulv DP (NOx 0.35)	18.3	13.7	7.7	0.0	19.5	19.2	20.1	18.3
Air to Fuel Ratio	2.18	1.94	2.51	Over	2.18	2.31	1.96	2.22
Pulv Inlet Temp	301.8	318.6	309.8	69.1	292.9	313.1	340.3	350.8
Pulv Outlet Temp	151.1	151.5	142.4	99.6	152.3	151.9	151.3	152.8
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.2	0.0	-6.0
Air Bias	4.8	0.0	7.7	6.6	8.1	11.1	0.1	9.9
Hyd Skid Pr Fdbk	9.	2232.	1690.	4.	2127.	4.	2172.	2366.
Hyd Skid Pr Setpt	2356.	2400.	1862.	1149.	2352.	2309.	2373.	2305.

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7 mill operation
following 6 mill operation.

IP12_002929

1H Btlw Rotating Throat.

Printed out for: PHIL-H - 04-Aug-04 15:08:12
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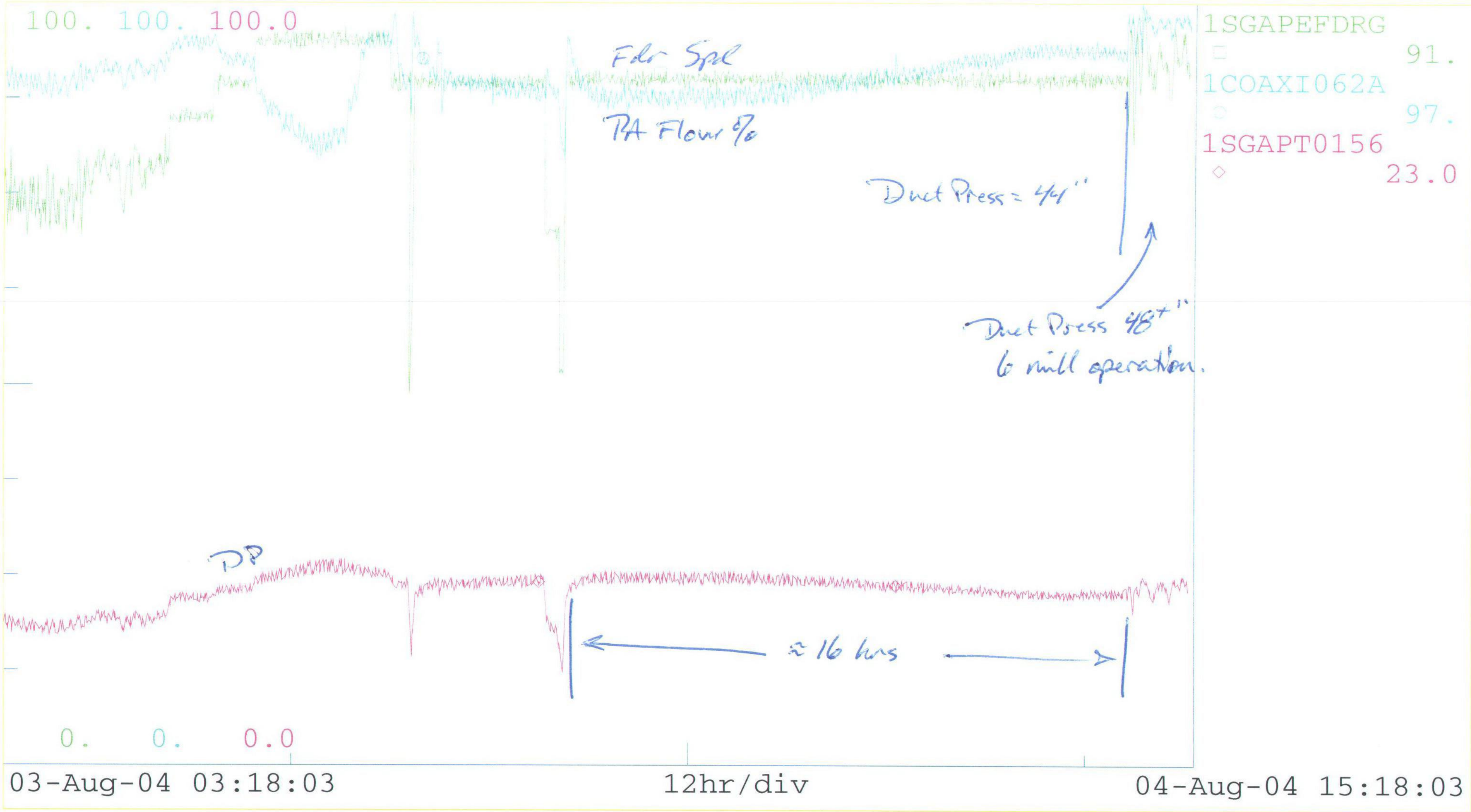

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6 mill Operation

IP12_002930

16 B&W Rotating Throat

Printed out for: PHIL-H - 04-Aug-04 15:06:50
0 Messages U1 Pulv U1 Pulv Operating data 04-Aug-04 15:06:50

Unit 1 940.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow369.2TPH	59.4	61.7	0.0	BadI	59.8	57.1	60.1	59.2
Feeder Speed	88.2	92.8	0.0	Calc	89.9	84.2	90.1	88.3
Amps (Duct Pr49.5)	61.9	64.4	0.0	0.0	71.2	55.5	50.5	68.0
Coal Pipe Vel	4345.	4282.	0.	4.	4431.	4322.	4332.	4447.
PA Flow %	98.8	95.6	0.0	0.1	100.	98.7	96.8	100.
PA Damper Pos	90.1	82.8	0.0	0.0	100.	100.	87.2	99.9
SA Damper Pos	84.5	84.7	10.0	10.0	84.8	84.6	84.5	79.6
PA Mass Flow	3898.	3816.	0.	4.	3955.	3865.	3867.	3955.
Pulv DP (NOx 0.36)	21.5	16.6	0.0	0.0	24.2	22.1	23.1	22.4
Air to Fuel Ratio	1.94	1.81	Calc	Calc	1.94	2.03	1.89	1.98
Pulv Inlet Temp	332.6	328.5	110.4	69.0	322.7	341.1	360.8	371.7
Pulv Outlet Temp	149.7	151.5	128.8	99.2	150.9	150.9	150.8	152.8
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.2	0.0	-6.0
Air Bias	4.8	0.0	7.7	6.6	8.1	11.1	0.1	9.9
Hyd Skid Pr Fdbk	8.	2233.	1004.	4.	2142.	4.	2170.	2345.
Hyd Skid Pr Setpt	2400.	2400.	1149.	1149.	2400.	2400.	2400.	2400.

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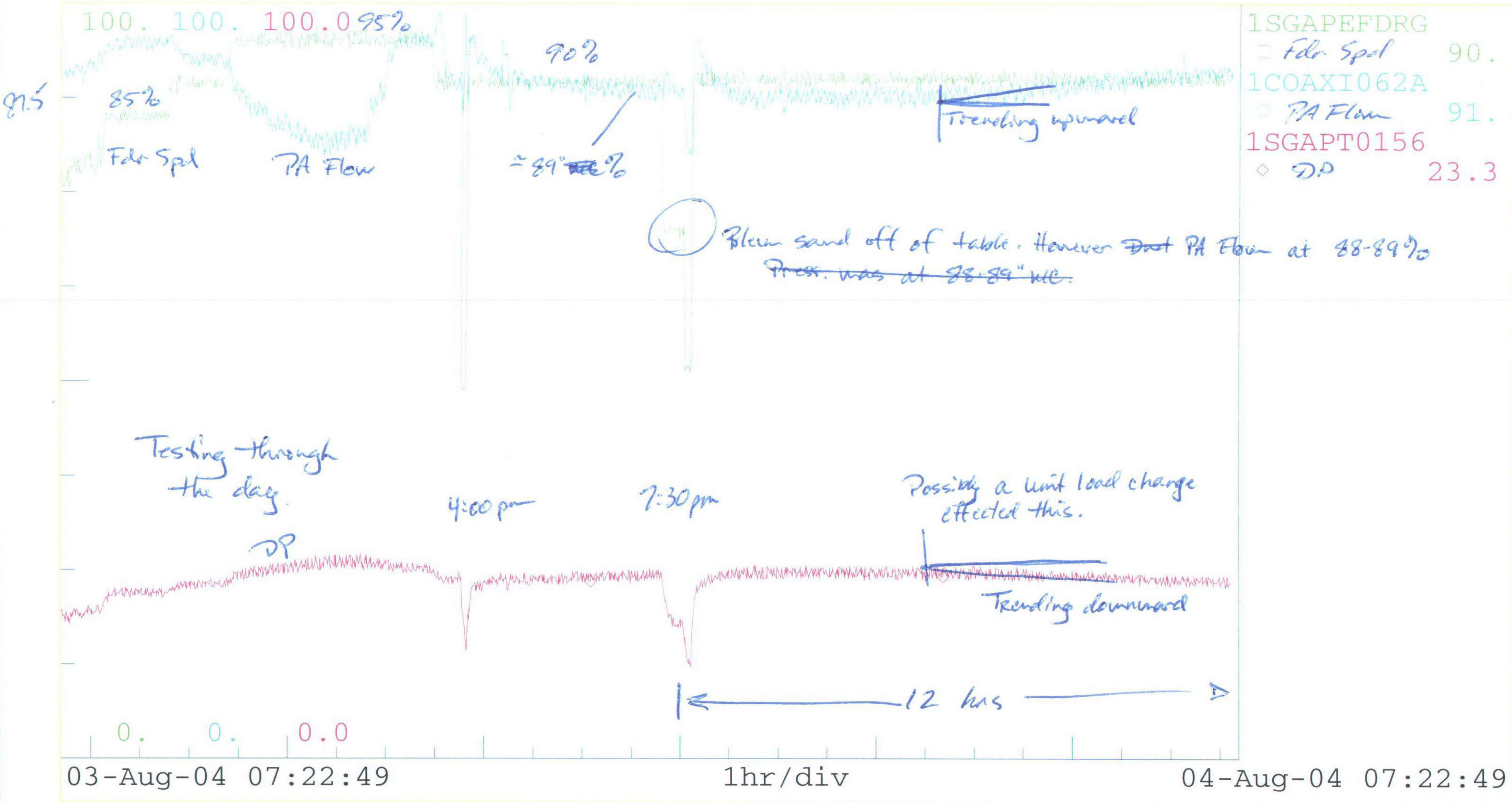
6 mill Operation

IP12_002931

U1 6 Mill B'w Rot. Throats

Printed out for: PHIL-H - 04-Aug-04 07:13:53
0 Messages U1 Pulv U1 Pulv Operating data 04-Aug-04 07:13:53



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IP12_002932

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Printed out for: UNIT1OP - 03-Aug-04 16:01:00

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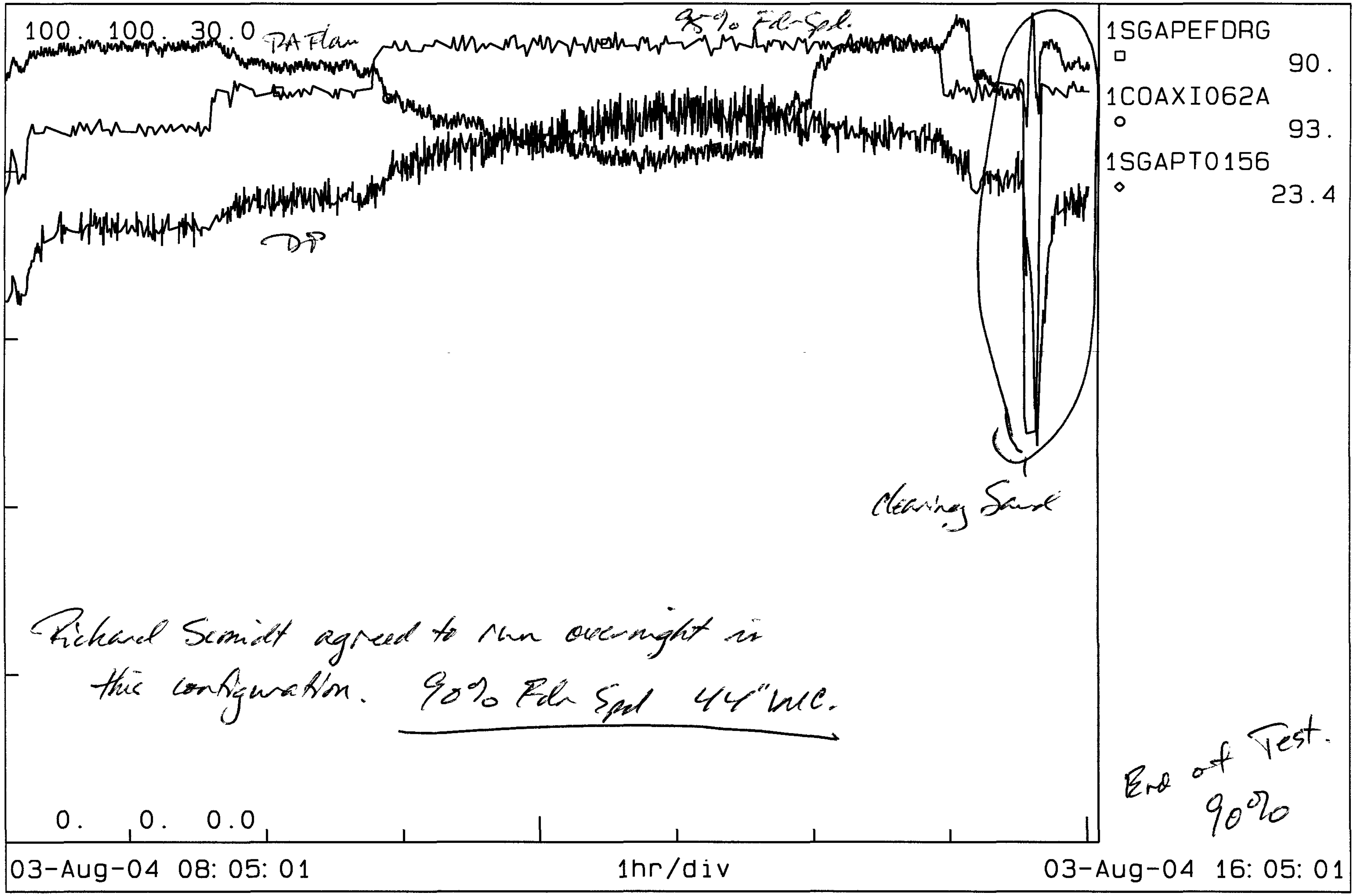

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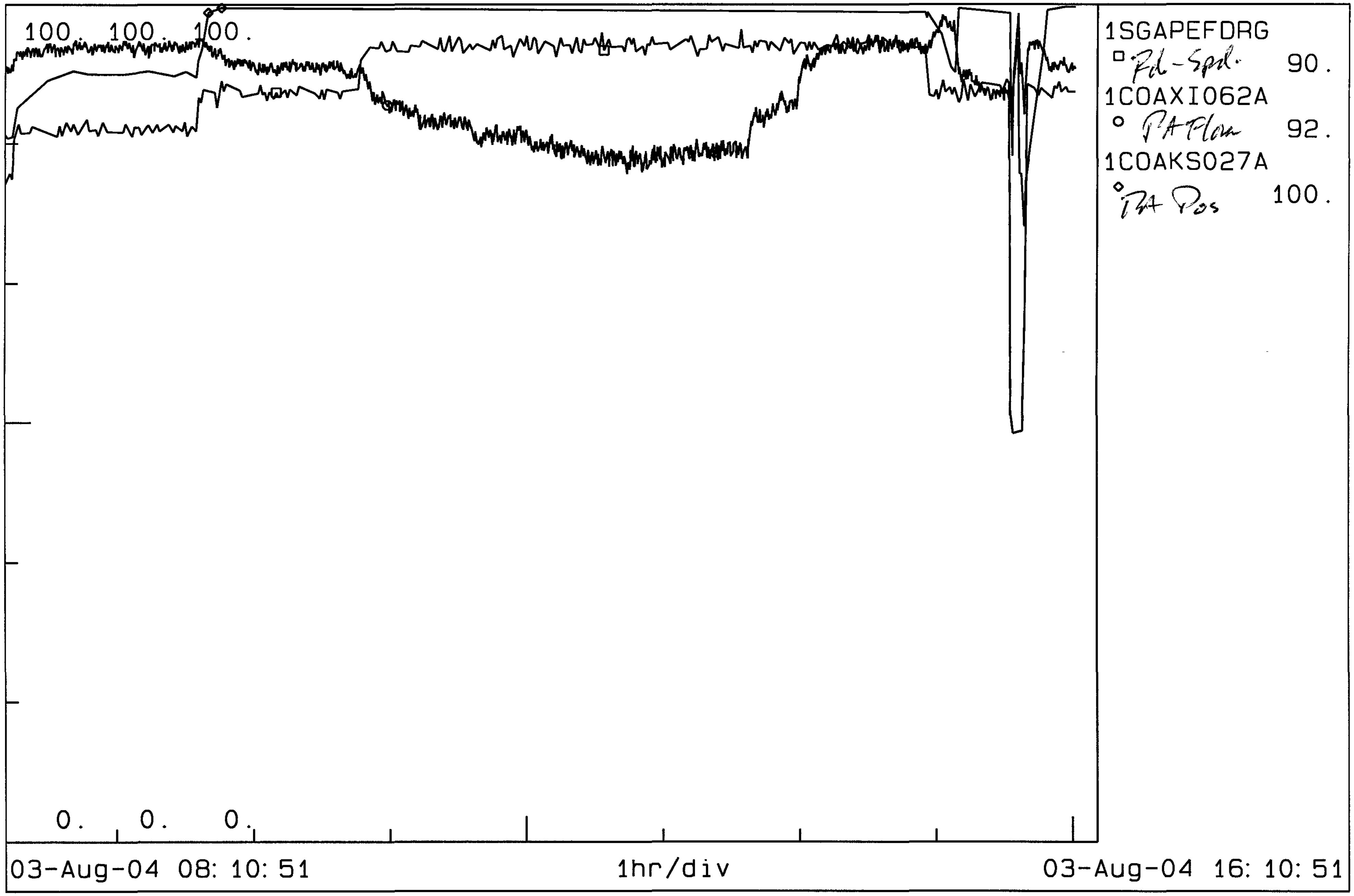
0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 16:01:12



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Printed out for: UNIT1OP - 03-Aug-04 16:01:30

0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 16:01:30

Unit 1 951.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow374.5TPH	51.1	53.3	52.6	BadI	52.1	49.4	61.3	52.0
Feeder Speed	75.5	78.0	75.6	Calc	76.2	72.5	89.5	74.9
Amps (Duct Pr44.4)	60.2	70.9	66.5	0.0	64.7	51.2	51.2	68.7
Coal Pipe Vel	4131.	4022.	4324.	4.	4336.	4389.	4076.	4352.
PA Flow %	92.5	90.2	96.8	0.1	97.7	100.	92.1	97.6
PA Damper Pos	83.6	79.8	79.9	1.3	86.3	91.4	99.7	84.4
SA Damper Pos	71.7	71.6	75.2	10.0	72.1	70.3	86.3	67.2
PA Mass Flow	3702.	3579.	3874.	4.	3847.	3942.	3648.	3898.
Pulv DP (NOx 0.36)	16.6	11.5	14.4	0.0	15.5	18.2	23.3	15.2
Air to Fuel Ratio	2.16	2.03	2.26	Calc	2.25	2.41	1.80	2.30
Pulv Inlet Temp	293.3	293.3	290.2	125.8	280.9	288.3	321.4	298.8
Pulv Outlet Temp	150.1	150.9	150.6	91.8	150.9	150.6	149.4	149.7
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-4.0
Air Bias	4.8	0.0	7.7	6.6	8.1	11.1	0.1	9.3
Hyd Skid Pr Fdbk	8.	2249.	2259.	2.	2107.	4.	2184.	2225.
Hyd Skid Pr Setpt	2283.	2360.	2351.	1149.	2309.	2202.	2400.	2309.

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IP12_002936

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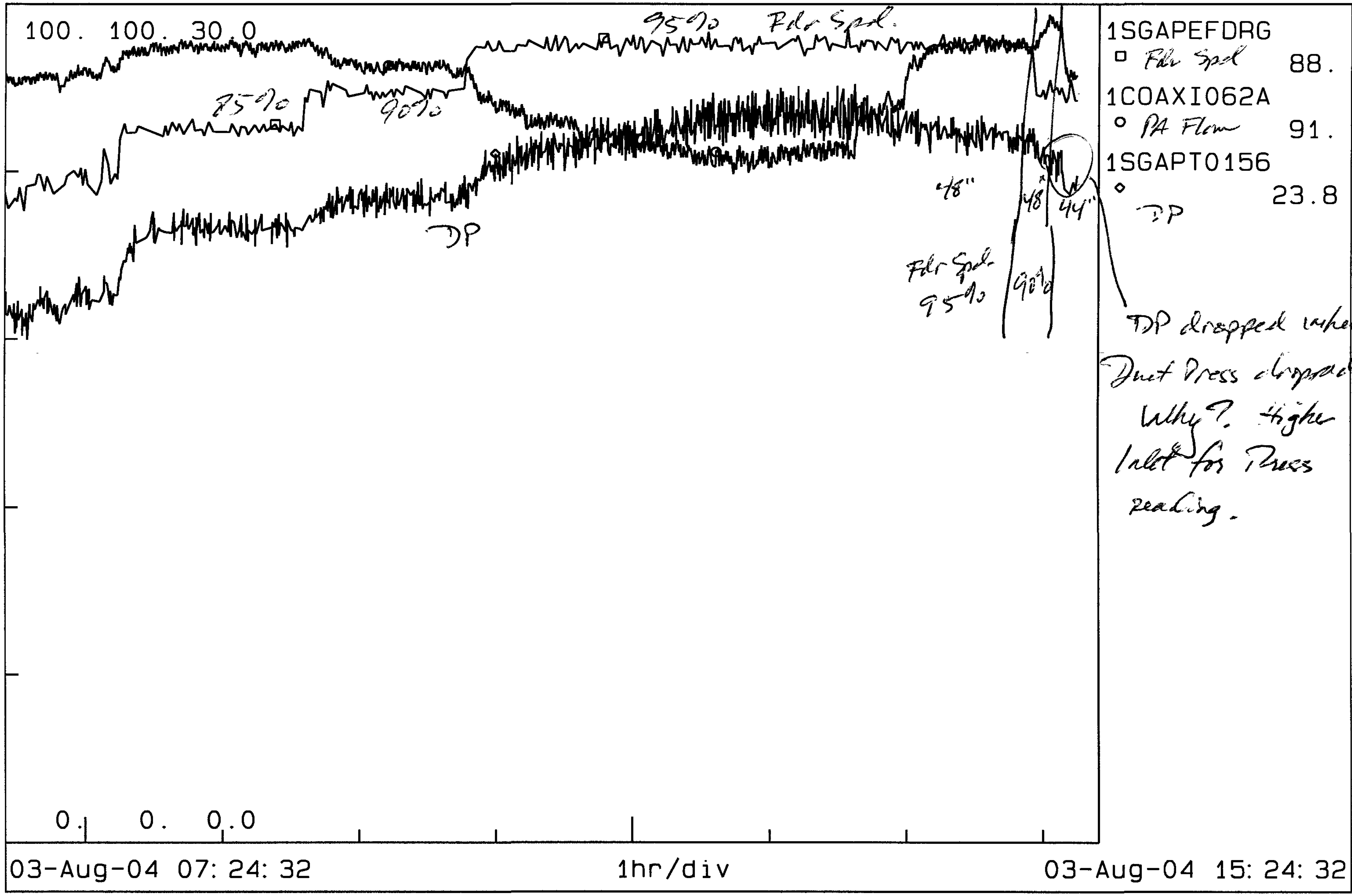

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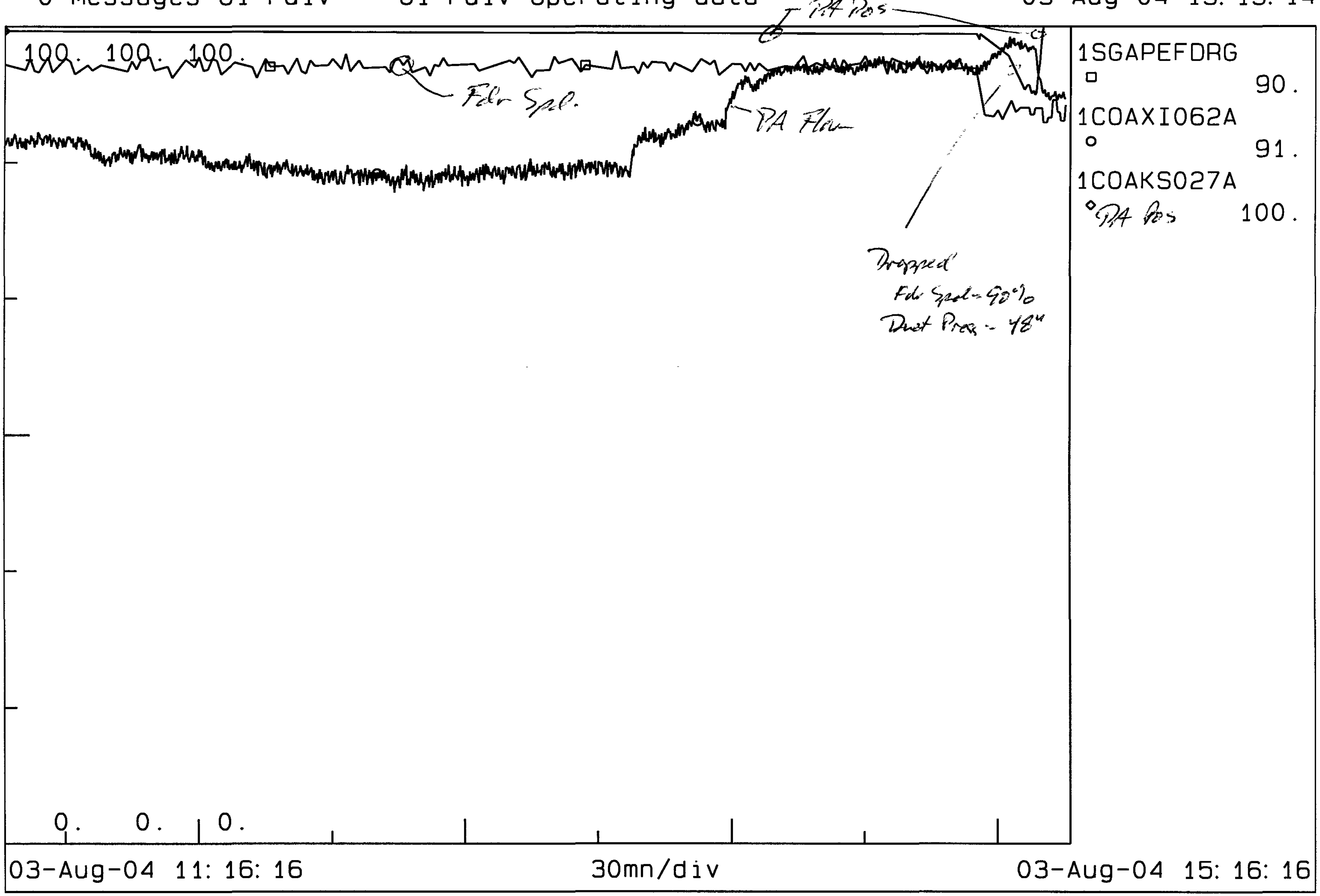

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IP12_002938

Printed out for: UNIT1OP - 03-Aug-04 15: 15: 21

0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 15: 15: 21

Unit 1 950.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow378.4TPH	51.2	53.4	52.3	BadI	52.0	48.7	61.5	50.6
Feeder Speed	75.9	78.1	77.0	Calc	76.2	71.8	90.3	76.7
Amps (Duct Pr44.5)	57.4	65.2	65.4	0.0	67.9	49.7	53.9	66.4
Coal Pipe Vel	4043.	4065.	4324.	5.	4380.	4404.	4070.	4339.
PA Flow %	91.6	90.5	97.3	0.1	97.6	99.9	91.2	97.6
PA Damper Pos	82.9	79.7	80.1	1.3	86.3	94.2	100.	84.4
SA Damper Pos	70.7	71.0	74.7	10.0	71.4	69.9	86.7	66.5
PA Mass Flow	3630.	3574.	3886.	5.	3860.	3947.	3611.	3879.
Pulv DP (NOx 0.38)	17.0	11.6	15.3	0.0	15.6	17.8	23.4	14.9
Air to Fuel Ratio	2.12	2.05	2.23	Calc	2.27	2.42	1.76	2.27
Pulv Inlet Temp	295.4	294.1	311.9	120.5	276.9	292.1	328.2	299.9
Pulv Outlet Temp	148.0	150.6	149.7	89.9	148.9	149.7	148.8	149.4
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-4.0
Air Bias	4.8	0.0	7.7	6.6	8.1	11.1	0.1	9.3
Hyd Skid Pr Fdbk	7.	2247.	2247.	2.	2118.	4.	2166.	2235.
Hyd Skid Pr Setpt	2262.	2353.	2299.	1149.	2276.	2174.	2400.	2309.

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Printed out for: UNIT1OP - 03-Aug-04 15:02:54

0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 15:02:54

Unit 1 952.5 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow371.0TPH	48.3	50.6	49.7	BadI	49.2	47.1	61.2	49.4
Feeder Speed	73.4	76.2	74.4	Calc	74.1	70.3	89.4	73.7
Amps (Duct Pr48.3)	58.7	68.2	66.4	0.0	68.2	51.9	52.9	65.0
Coal Pipe Vel	4095.	4027.	4331.	4.	4348.	4420.	4278.	4334.
PA Flow %	92.2	88.9	96.2	0.1	96.2	98.2	98.2	96.7
PA Damper Pos	76.2	75.5	73.2	1.3	79.4	79.3	96.1	78.7
SA Damper Pos	66.4	67.0	70.5	10.0	66.9	65.5	86.3	62.6
PA Mass Flow	3662.	3596.	3806.	4.	3823.	3914.	3867.	3842.
Pulv DP (NOx 0.37)	17.2	10.6	13.7	0.0	15.0	16.1	24.2	14.8
Air to Fuel Ratio	2.20	2.08	2.30	Calc	2.30	2.46	1.88	2.32
Pulv Inlet Temp	290.7	291.0	288.6	120.2	276.4	283.6	324.7	298.4
Pulv Outlet Temp	149.4	150.9	150.4	89.3	149.7	150.1	151.5	150.6
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-4.0
Air Bias	4.8	0.0	7.7	6.6	8.1	11.1	0.1	9.3
Hyd Skid Pr Fdbk	7.	2241.	2273.	2.	2076.	4.	2178.	2218.
Hyd Skid Pr Setpt	2175.	2262.	2227.	1149.	2186.	2133.	2400.	2213.

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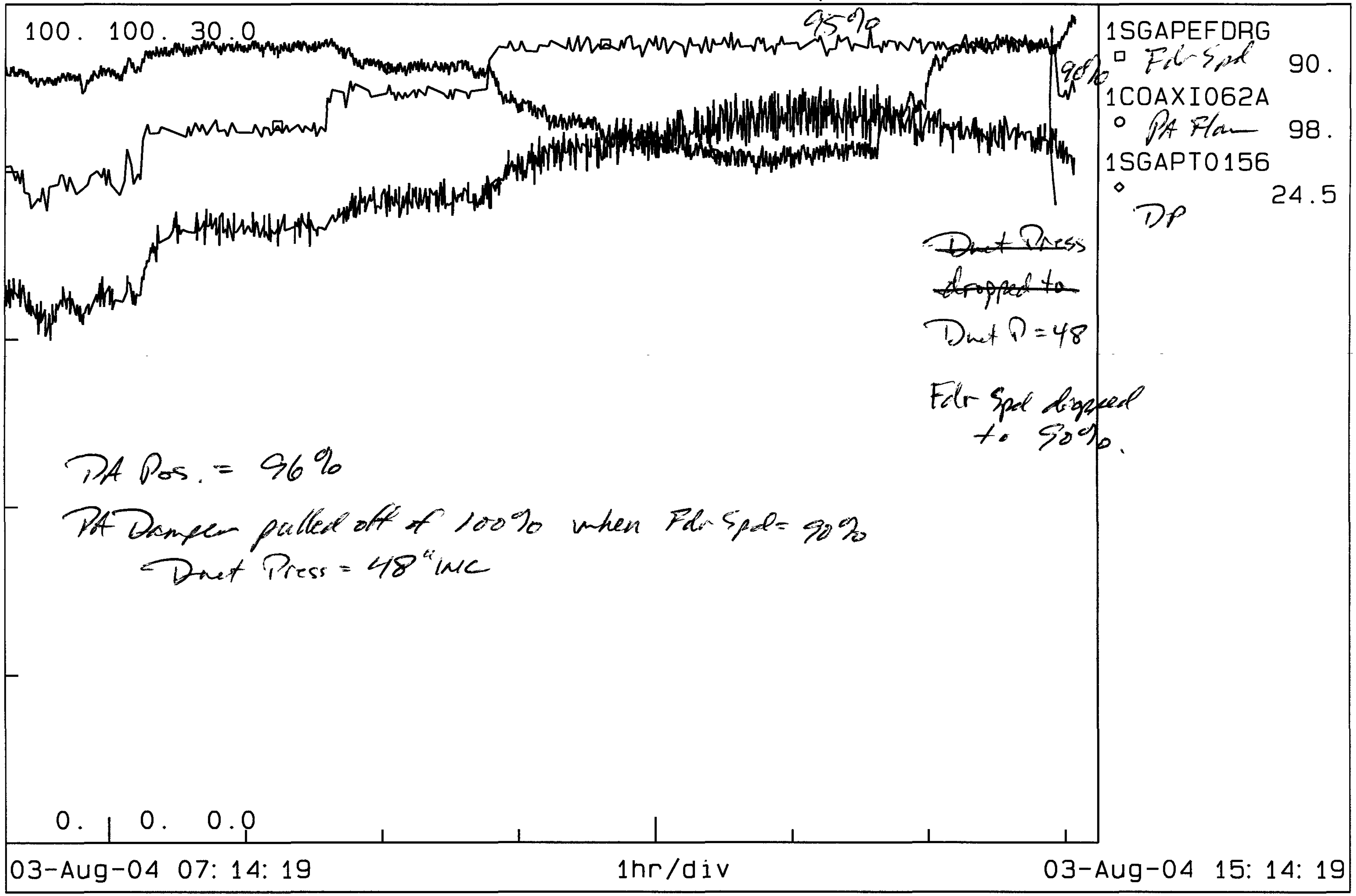
Printed out for: UNIT1OP - 03-Aug-04 15:04:26 B: w/ Rot Throat.

0 Messages U1 Pulv U1 Pulv Operating data 1G 03-Aug-04 15:04:26



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IP12_002941

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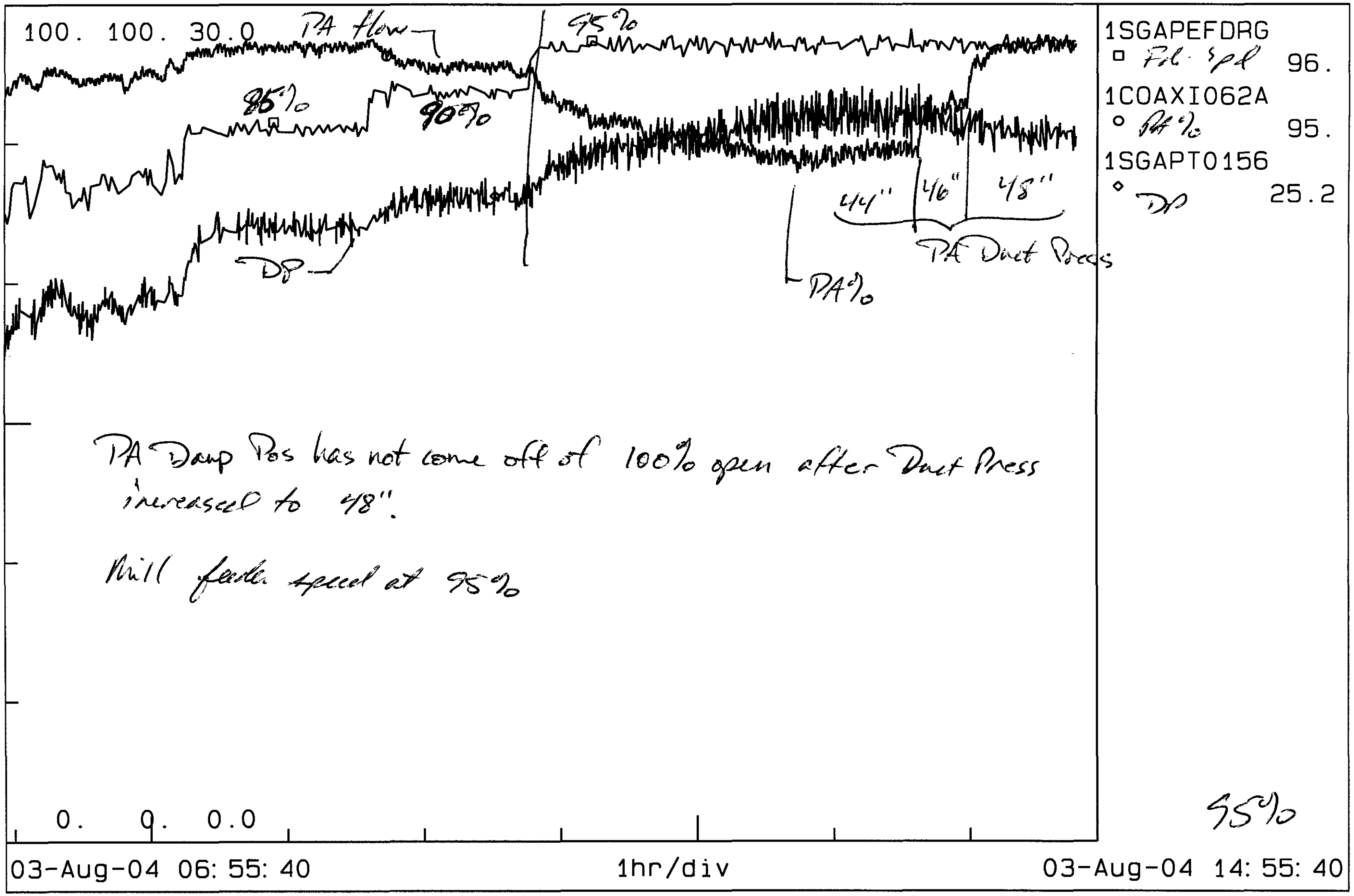

PA Damp Pos has not come off of 100% open after Duct Press increased to 48".

Mill feeder speed at 95%

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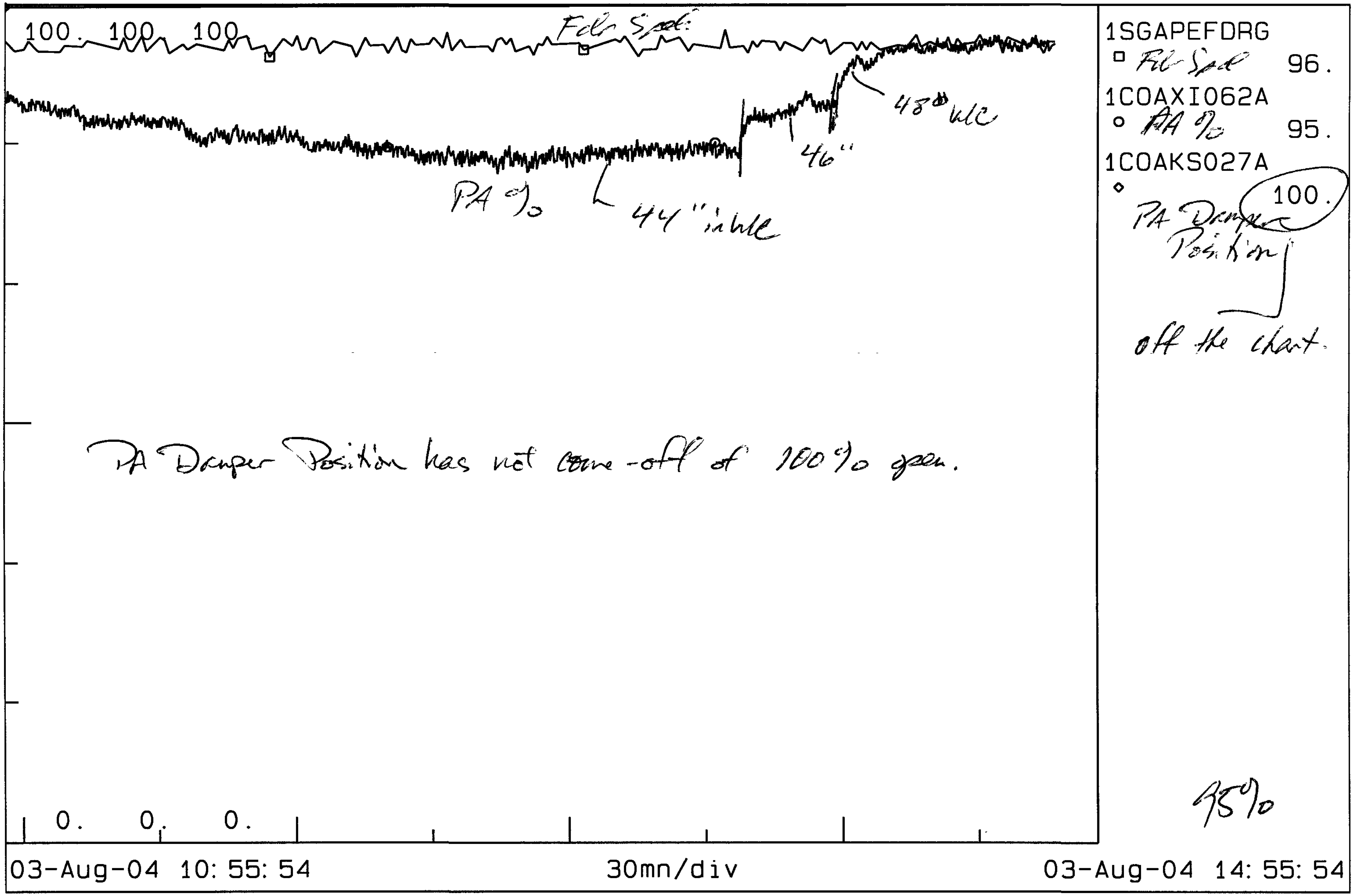

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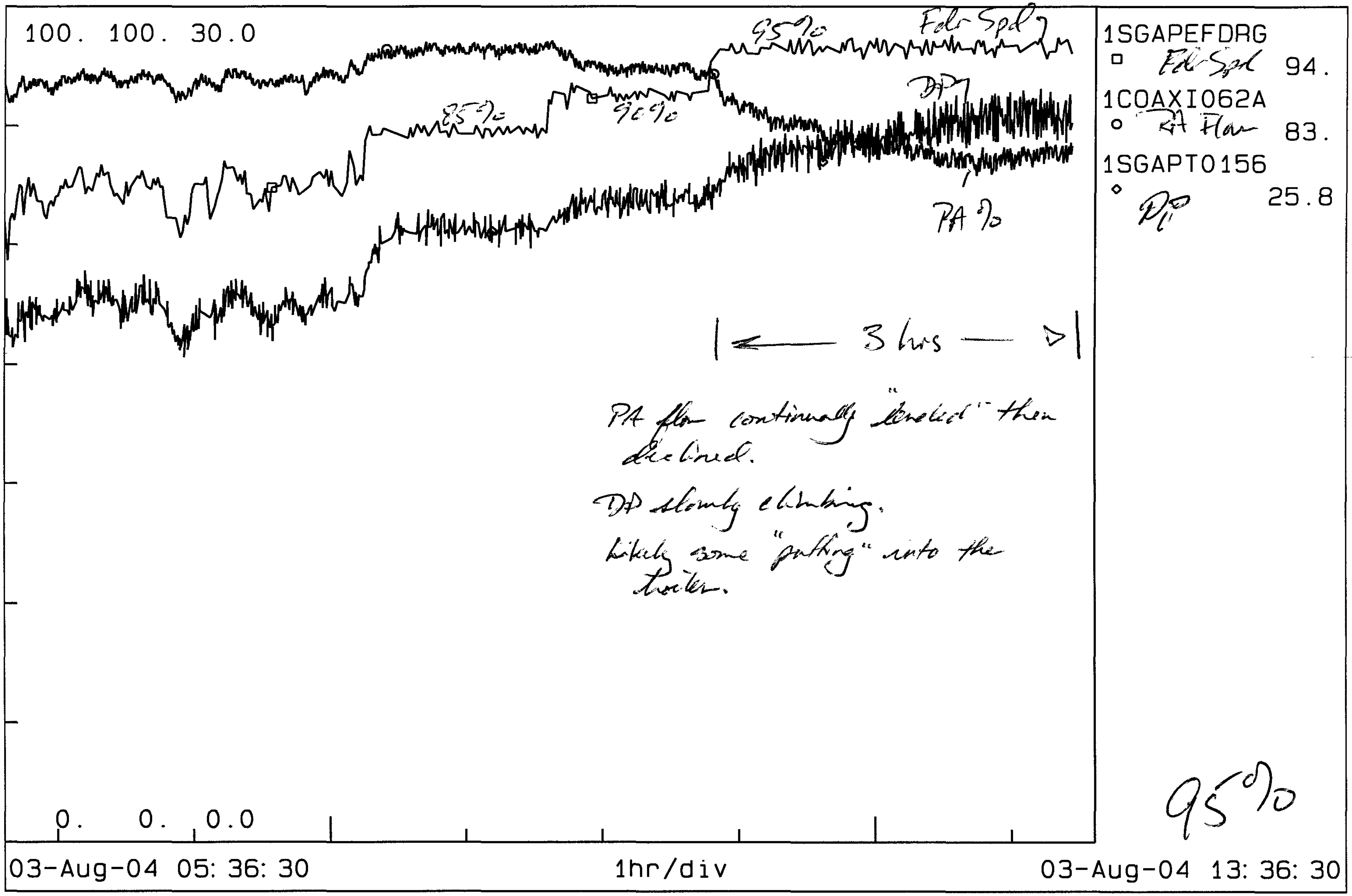
IP12_002943

Printed out for: UNIT1OP - 03-Aug-04 13: 26: 39 Unit 1G B!W Pot. Throat.

0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 13: 26: 39



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Pugh

Printed out for: UNIT1OP - 03-Aug-04 13:25:17 Unit 1 G B'we Post Throat
0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 13:25:17

Unit 1 948.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow372.4TPH	52.7	55.0	53.5	0.1	53.3	50.1	64.4	53.3
Feeder Speed	77.4	81.4	79.7	0.1	79.4	74.4	95.1	79.5
Amps (Duct Pr44.1)	58.2	65.7	63.7	0.0	66.0	52.2	60.2	65.4
Coal Pipe Vel	4069.	4012.	4295.	4.	4328.	4345.	3637.	4266.
PA Flow %	92.5	90.5	98.0	0.1	98.3	99.7	81.4	97.8
PA Damper Pos	81.8	79.8	79.9	1.3	86.5	87.9	100.	84.2
SA Damper Pos	73.9	74.2	78.0	10.0	74.7	73.1	91.2	69.9
PA Mass Flow	3644.	3586.	3843.	4.	3872.	3931.	3252.	3856.
Pulv DP (NOx 0.36)	16.6	11.9	15.1	0.0	16.0	16.9	26.1	14.5
Air to Fuel Ratio	2.08	1.94	2.13	2.33	2.15	2.34	1.51	2.14
Pulv Inlet Temp	281.6	289.1	285.3	114.8	271.2	280.1	369.6	296.5
Pulv Outlet Temp	148.9	150.6	150.0	86.1	150.1	149.4	150.6	150.9
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-4.0
Air Bias	4.8	0.0	7.7	6.6	8.1	11.1	0.1	9.3
Hyd Skid Pr Fdbk	5.	2251.	2243.	2.	2123.	3.	2159.	2314.
Hyd Skid Pr Setpt	2337.	2400.	2366.	1149.	2347.	2243.	2400.	2358.

EndTim= 03-Aug-04 13:25:16 /EvalTim= 03-Aug-04 13:25:16 /PanRate= 0

Pugh

IP12_002945

Printed out for: UNIT1OP - 03-Aug-04 13:27:12
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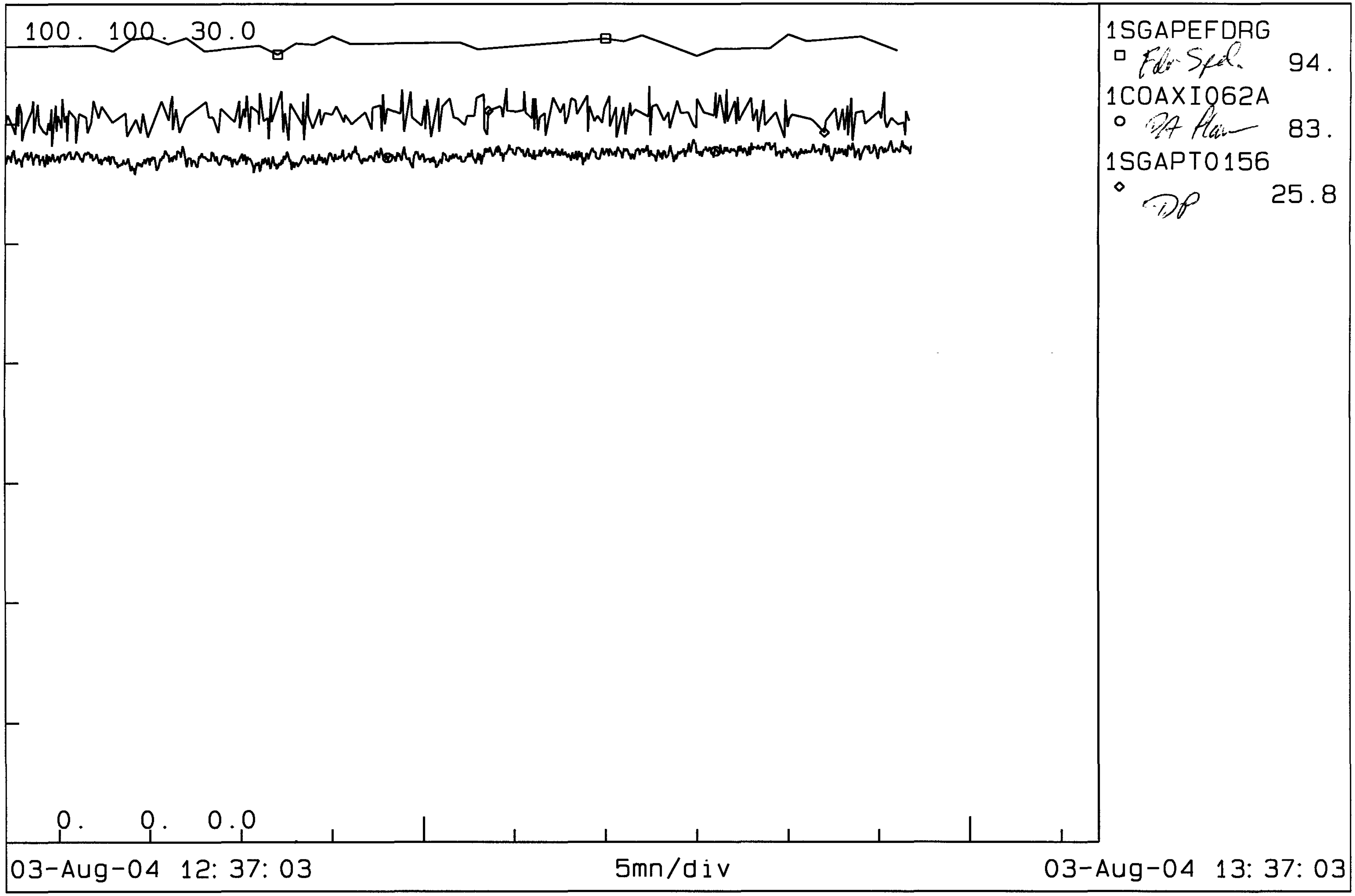

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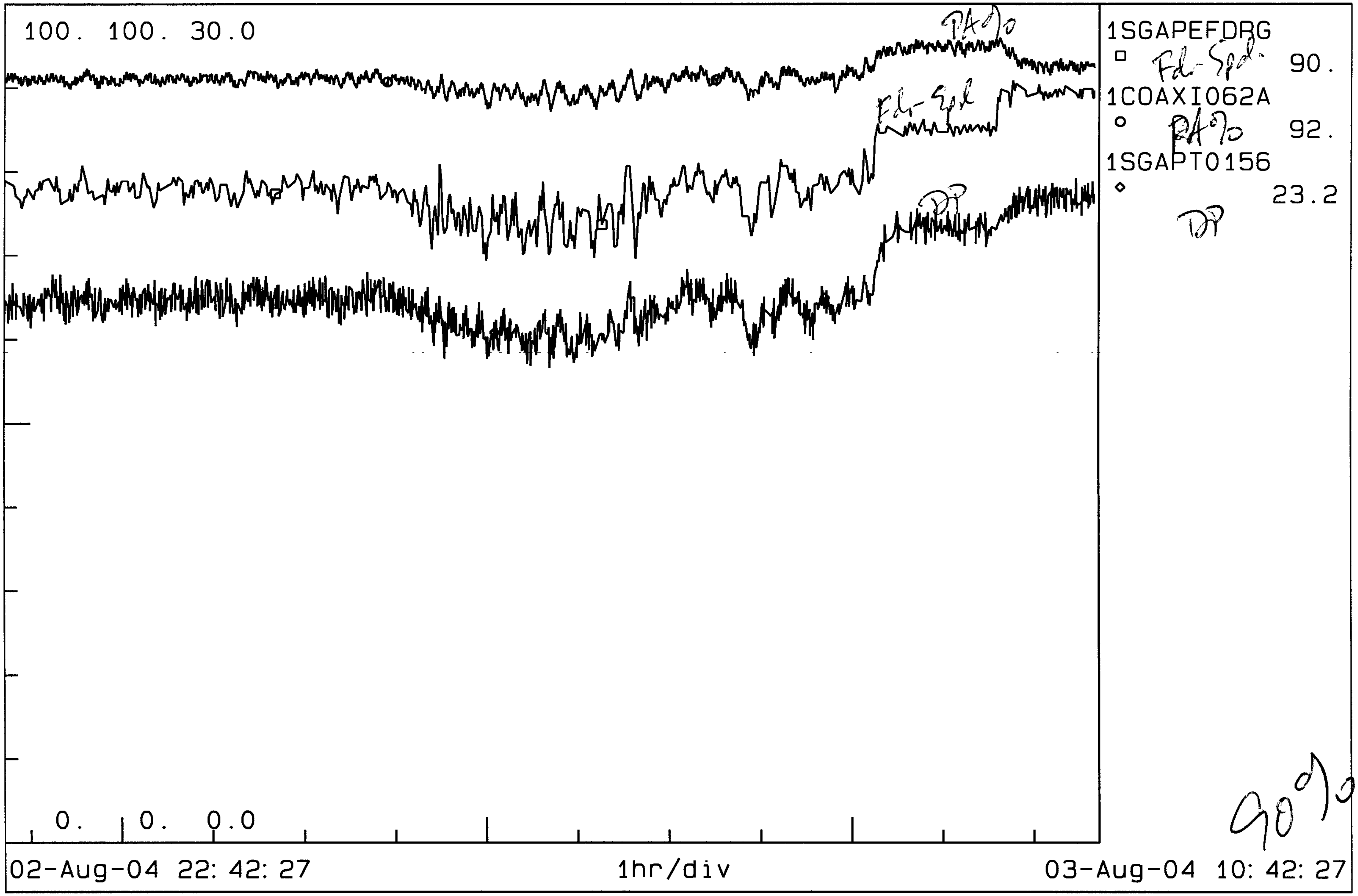
IP12_002946

Pugh

Printed out for: UNIT1OP - 03-Aug-04 10: 39: 19 B&W Rotating Throat

0 Messages U1 Pulv U1 Pulv Operating data 16 Mill 03-Aug-04 10: 39: 19



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Printed out for: UNIT1OP - 03-Aug-04 10:39:13 B'ler Rotating Throat.

0 Messages U1 Pulv U1 Pulv Operating data 16 Mrl 03-Aug-04 10:39:13

Unit 1 947.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow368.8TPH	50.3	51.7	50.9	0.1	50.6	47.9	61.4	50.0
Feeder Speed	73.0	76.9	75.2	0.1	73.8	70.0	88.8	73.4
Amps (Duct Pr44.1)	60.4	68.4	63.4	0.0	65.0	51.9	51.9	66.2
Coal Pipe Vel	4109.	4011.	4319.	1.	4307.	4412.	4106.	4340.
PA Flow %	92.4	89.3	96.2	0.0	96.5	98.2	92.5	96.9
PA Damper Pos	80.5	78.1	78.3	1.3	85.9	84.6	100.	82.7
SA Damper Pos	68.7	68.9	72.5	10.0	69.1	67.6	86.3	64.5
PA Mass Flow	3662.	3591.	3871.	1.	3840.	3907.	3683.	3850.
Pulv DP (NOx 0.36)	15.7	11.3	15.0	0.2	16.5	15.8	22.8	14.6
Air to Fuel Ratio	2.23	2.06	2.28	0.58	2.29	2.47	1.83	2.32
Pulv Inlet Temp	292.2	296.3	284.9	107.1	275.6	286.1	335.9	296.6
Pulv Outlet Temp	150.1	151.9	150.9	80.4	150.0	150.9	150.3	150.6
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-4.0
Air Bias	4.8	0.0	7.7	6.6	8.1	11.1	0.1	9.3
Hyd Skid Pr Fdbk	1.	2260.	2243.	2.	2068.	2.	2153.	2230.
Hyd Skid Pr Setpt	2250.	2302.	2273.	1149.	2243.	2162.	2400.	2239.

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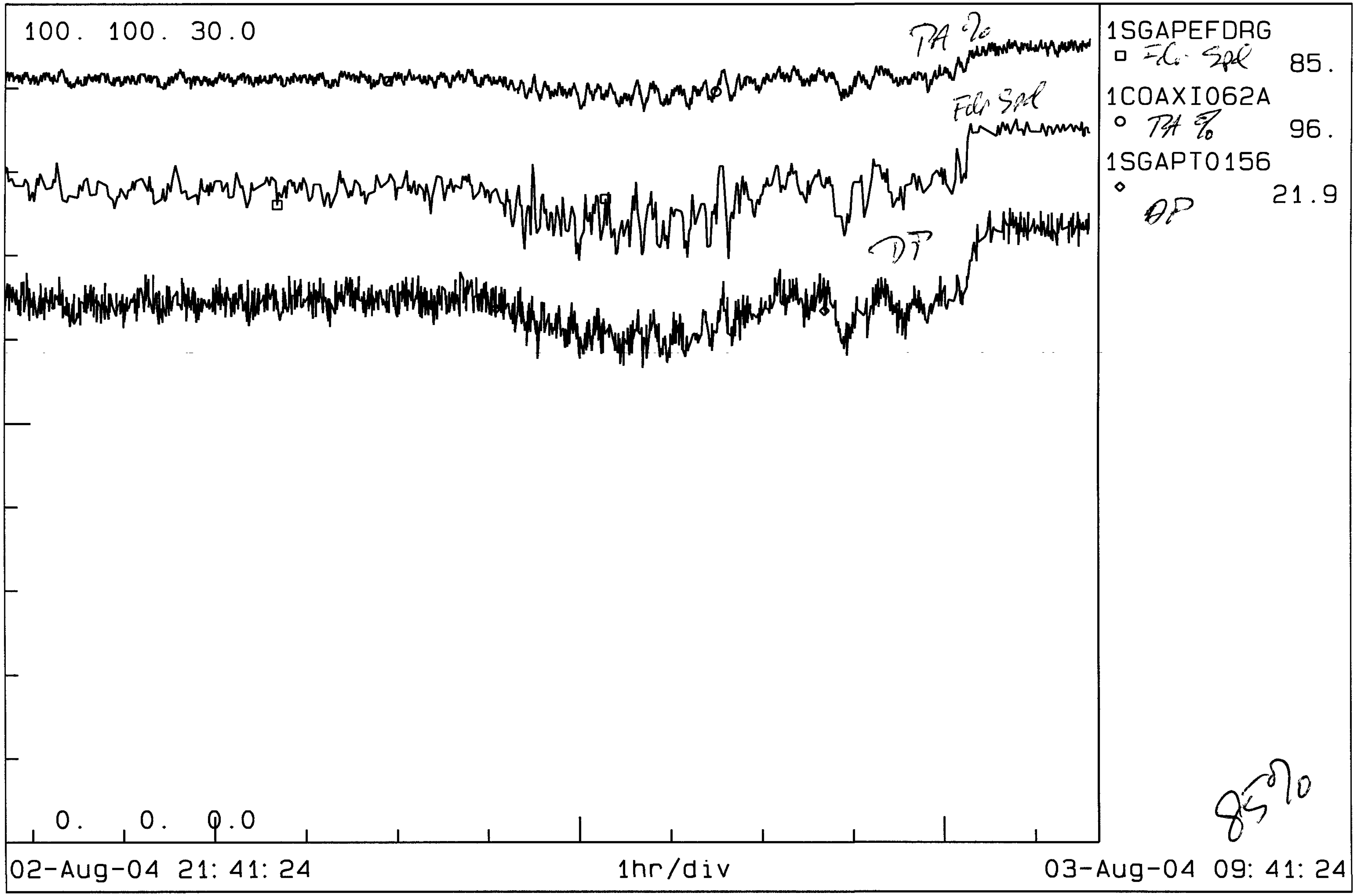
IP12_002948

: Printed out for: UNIT1OP - 03-Aug-04 09:35:31 B&W Rotating Throat.

0 Messages U1 Pulv U1 Pulv Operating data 1G Mill 03-Aug-04 09:35:31



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IP12_002949

Printed out for: UNIT1OP - 03-Aug-04 09:35:40
0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 09:35:40

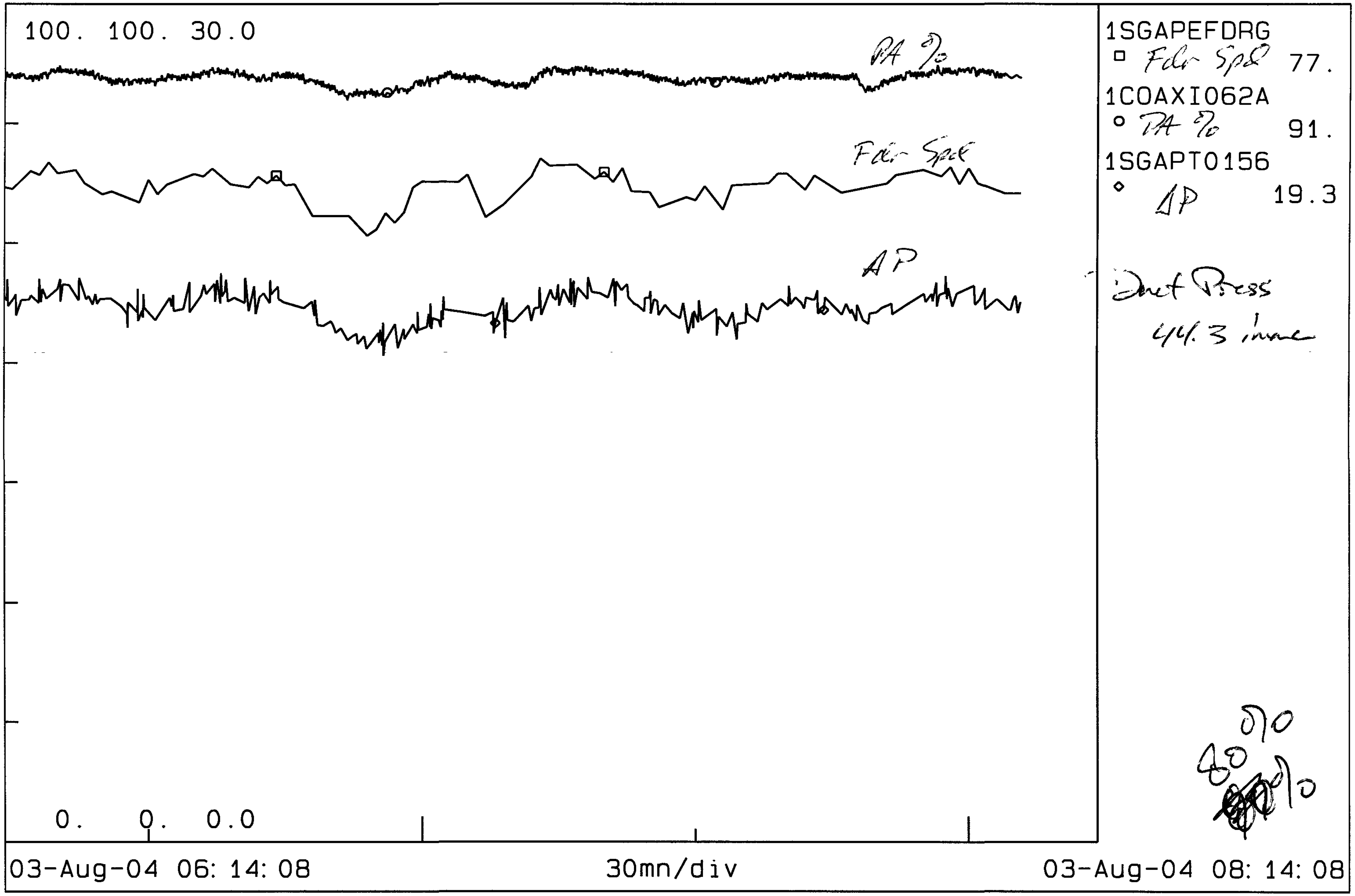
Unit 1 950.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow371.0TPH	50.7	53.3	51.8	0.1	51.8	49.0	60.5	51.4
Feeder Speed	76.1	78.8	77.5	0.1	76.2	72.5	84.6	75.5
Amps (Duct Pr44.2)	59.5	65.9	70.5	0.0	64.4	51.2	50.9	66.2
Coal Pipe Vel	4089.	4009.	4343.	1.	4342.	4344.	4200.	4331.
PA Flow %	92.7	90.0	97.2	0.0	97.7	99.8	95.2	97.6
PA Damper Pos	80.8	78.6	79.7	1.3	87.1	87.3	92.6	83.5
SA Damper Pos	71.4	71.7	75.1	10.0	71.6	70.2	85.4	67.1
PA Mass Flow	3659.	3587.	3893.	1.	3886.	3940.	3761.	3878.
Pulv DP (NOx 0.37)	16.0	11.7	14.9	0.2	16.8	16.7	22.3	14.3
Air to Fuel Ratio	2.14	2.01	2.21	0.44	2.25	2.40	1.96	2.27
Pulv Inlet Temp	285.0	292.2	276.5	102.7	275.3	287.4	323.3	300.4
Pulv Outlet Temp	148.9	150.6	150.0	78.7	150.6	149.7	150.6	150.1
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-4.0
Air Bias	4.8	0.0	7.7	6.6	8.1	11.1	0.1	9.3
Hyd Skid Pr Fdbk	0.	2259.	2260.	0.	2093.	2.	2145.	2234.
Hyd Skid Pr Setpt	2282.	2350.	2315.	1149.	2287.	2200.	2400.	2314.

EndTim= 03-Aug-04 09:35:40 /EvalTim= 03-Aug-04 09:35:40 /PanRate= 0

Printed out for: UNIT1OP - 03-Aug-04 08:05:58

Beginning of Test

0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 08:05:58



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Pugh

IP12_002951

Printed out for: UNIT1OP - 03-Aug-04 08: 00: 18 !G Beginning of test.

0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 08: 00: 18

Unit 1 950.5 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow374.2TPH	53.1	55.5	53.9	0.1	54.2	51.2	54.2	53.9
Feeder Speed	77.6	81.2	79.3	0.1	79.5	75.3	80.3	79.3
Amps (Duct Pr44.1)	58.4	62.4	64.0	0.0	65.9	53.4	47.9	65.0
Coal Pipe Vel	4016.	4080.	4336.	1.	4361.	4407.	4020.	4358.
PA Flow %	91.2	91.6	99.0	0.0	99.2	100.	92.4	99.0
PA Damper Pos	82.9	80.2	80.9	1.3	89.7	92.1	83.1	85.2
SA Damper Pos	75.4	75.6	79.1	10.0	75.8	74.0	75.4	70.9
PA Mass Flow	3602.	3649.	3881.	1.	3909.	3947.	3637.	3909.
Pulv DP (NOx 0.34)	15.7	12.0	15.2	0.2	17.6	18.0	19.5	15.5
Air to Fuel Ratio	2.03	1.98	2.16	0.58	2.17	2.31	2.00	2.18
Pulv Inlet Temp	302.1	291.9	279.7	95.5	286.6	291.8	310.4	301.0
Pulv Outlet Temp	149.4	150.9	150.6	78.8	150.9	150.1	150.1	149.7
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-4.0
Air Bias	4.8	0.0	7.7	6.6	8.1	11.1	0.1	9.3
Hyd Skid Pr Fdbk	0.	2263.	2255.	0.	2140.	1.	2137.	2325.
Hyd Skid Pr Setpt	2352.	2400.	2385.	1149.	2363.	2280.	2394.	2386.

EndTim= 03-Aug-04 08: 00: 18 /EvalTim= 03-Aug-04 08: 00: 18 /PanRate= 0

Push.

IP12_002952

Printed out for: UNIT1OP - 03-Aug-04 16:02:15
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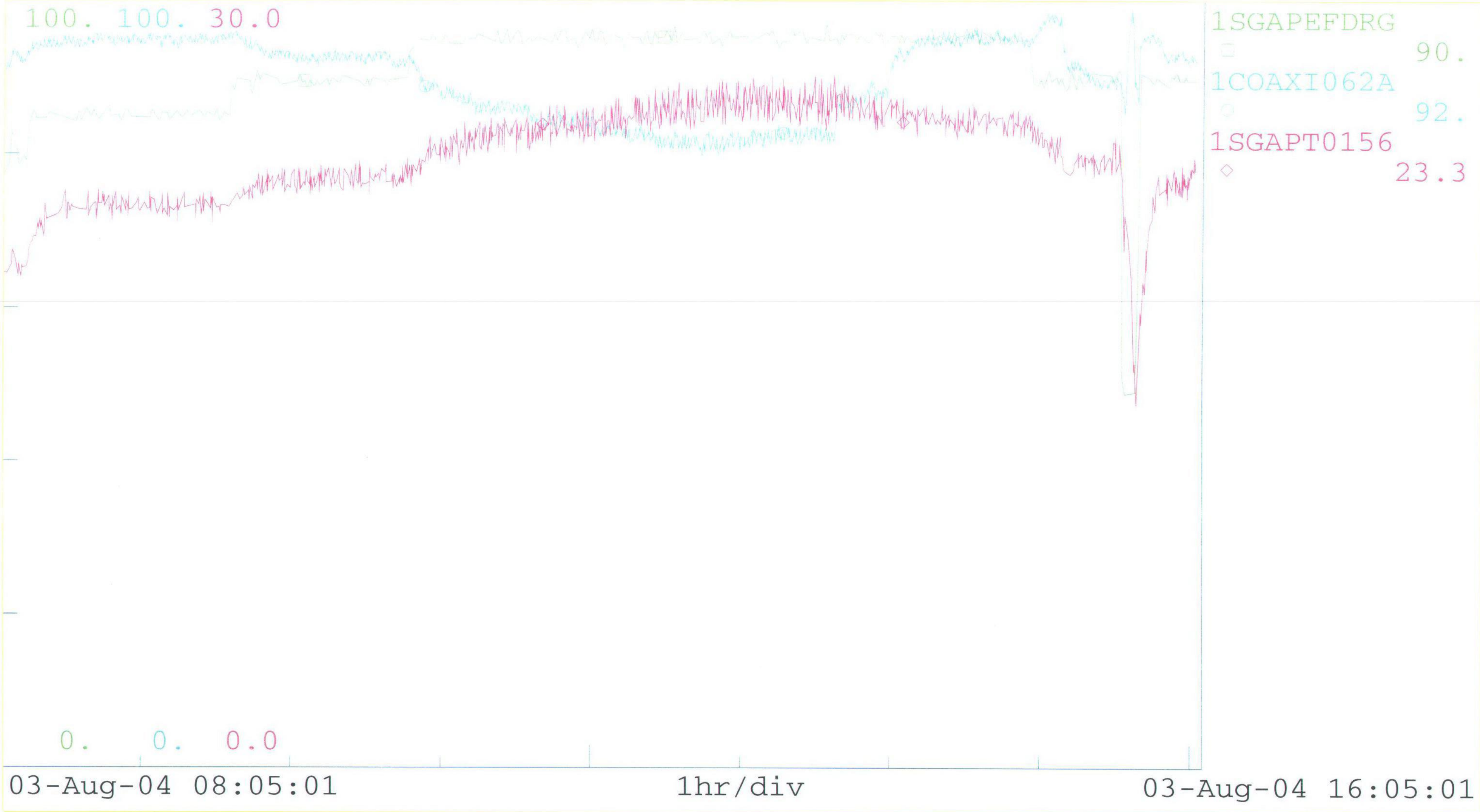

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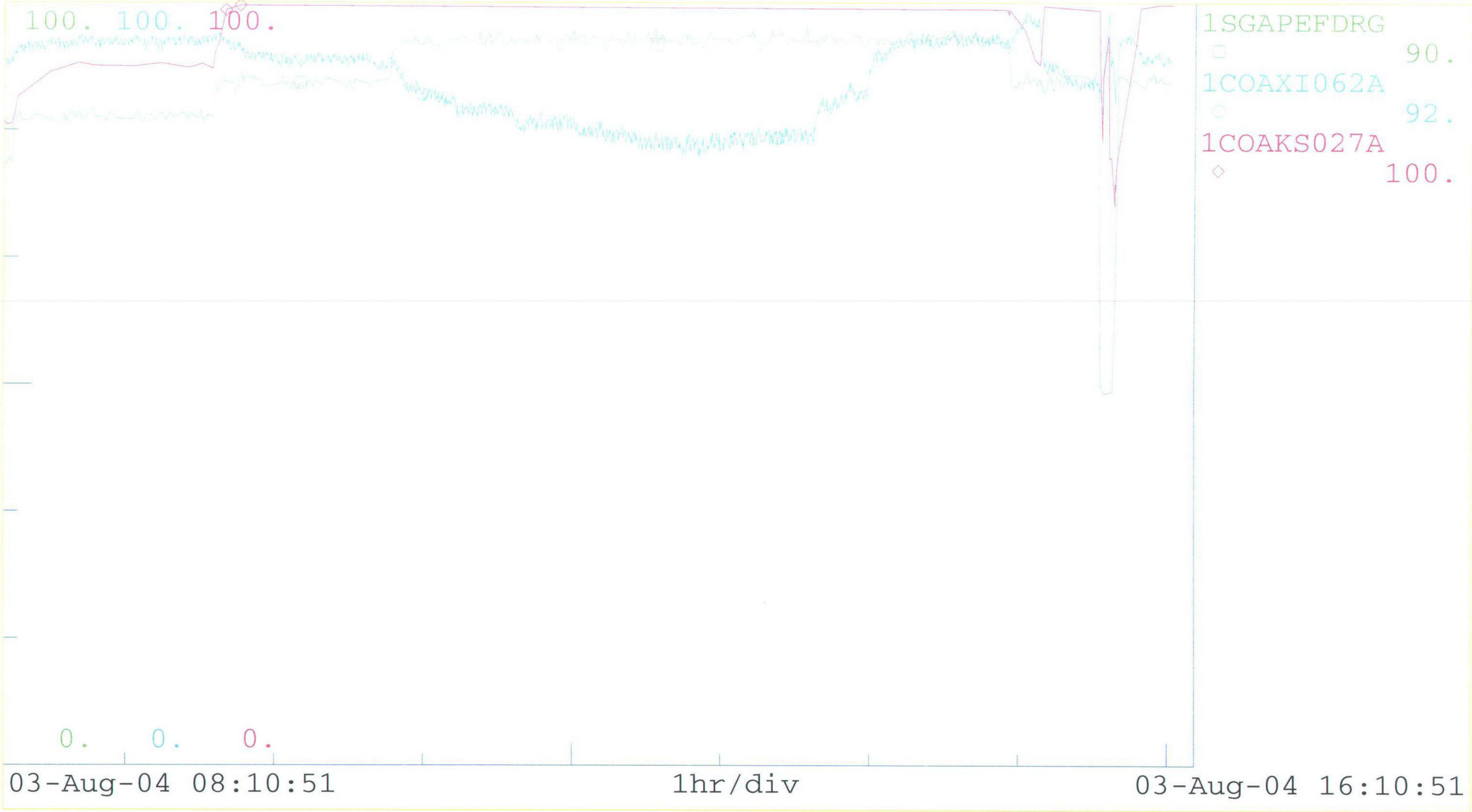

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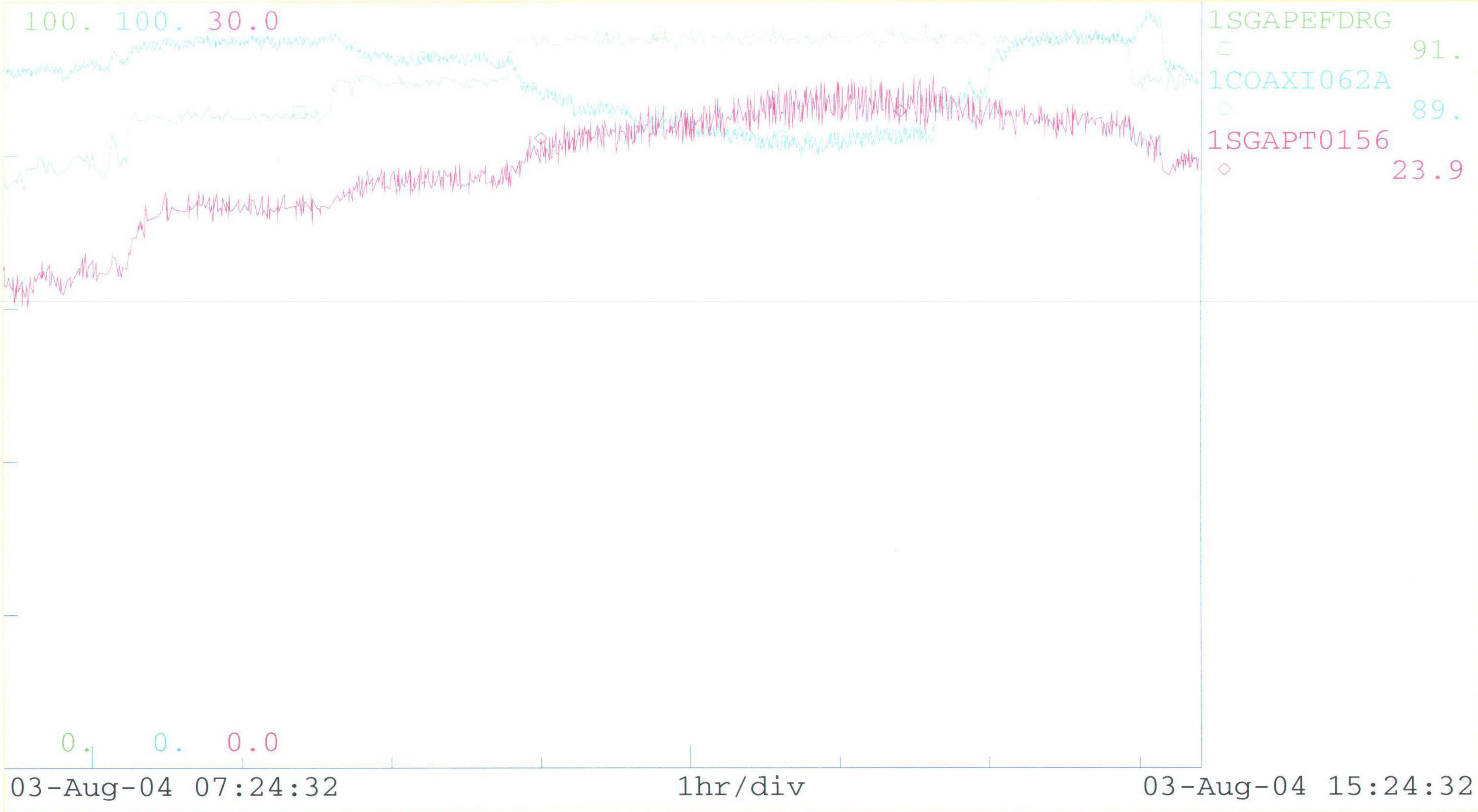
Printed out for: UNIT1OP - 03-Aug-04 16:01:42
0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 16:01:42

Unit 1 951.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow374.5TPH	51.1	53.3	52.6	BadI	52.1	49.4	61.3	52.0
Feeder Speed	75.5	78.0	75.6	Calc	76.2	72.5	89.5	74.9
Amps (Duct Pr44.4)	60.2	70.9	66.5	0.0	64.7	51.2	51.2	68.7
Coal Pipe Vel	4131.	4022.	4324.	4.	4336.	4389.	4076.	4352.
PA Flow %	92.5	90.2	96.8	0.1	97.7	100.	92.1	97.6
PA Damper Pos	83.6	79.8	79.9	1.3	86.3	91.4	99.7	84.4
SA Damper Pos	71.7	71.6	75.2	10.0	72.1	70.3	86.3	67.2
PA Mass Flow	3702.	3579.	3874.	4.	3847.	3942.	3648.	3898.
Pulv DP (NOx 0.36)	16.6	11.5	14.4	0.0	15.5	18.2	23.3	15.2
Air to Fuel Ratio	2.16	2.03	2.26	Calc	2.25	2.41	1.80	2.30
Pulv Inlet Temp	293.3	293.3	290.2	125.8	280.9	288.3	321.4	298.8
Pulv Outlet Temp	150.1	150.9	150.6	91.8	150.9	150.6	149.4	149.7
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-4.0
Air Bias	4.8	0.0	7.7	6.6	8.1	11.1	0.1	9.3
Hyd Skid Pr Fdbk	8.	2249.	2259.	2.	2107.	4.	2184.	2225.
Hyd Skid Pr Setpt	2283.	2360.	2351.	1149.	2309.	2202.	2400.	2309.

EndTim= 03-Aug-04 16:01:42 /EvalTim= 03-Aug-04 16:01:42 /PanRate= 0

IP12_002955

Printed out for: UNIT1OP - 03-Aug-04 15:23:59
0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 15:23:59



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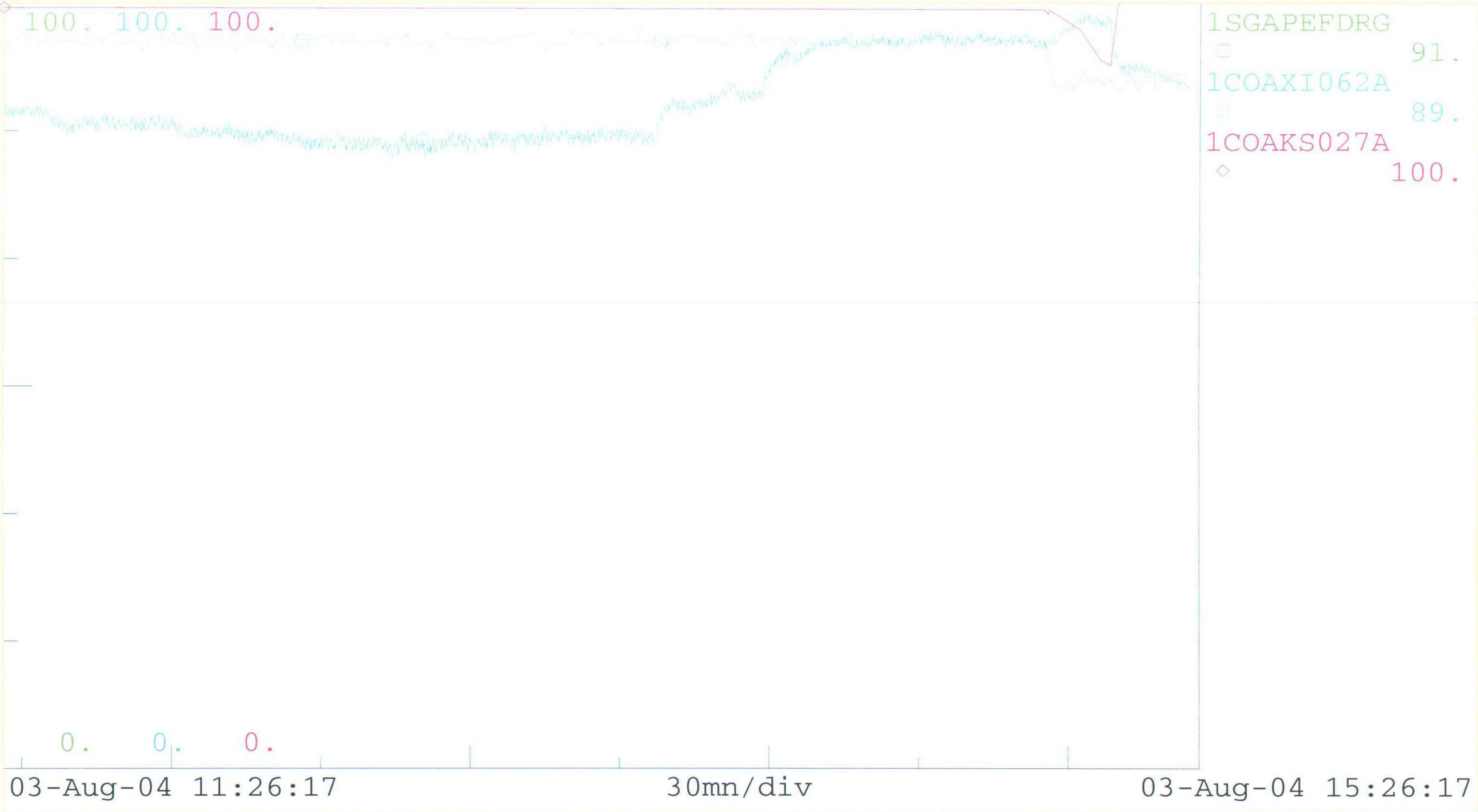
0 Messages U1 Pulv U1 Pulv Operating data 03-Aug-04 15:24:12



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Printed out for: UNIT1OP - 03-Aug-04 15:24:22
0 Messages U1 Pulv . U1 Pulv Operating data 03-Aug-04 15:24:22

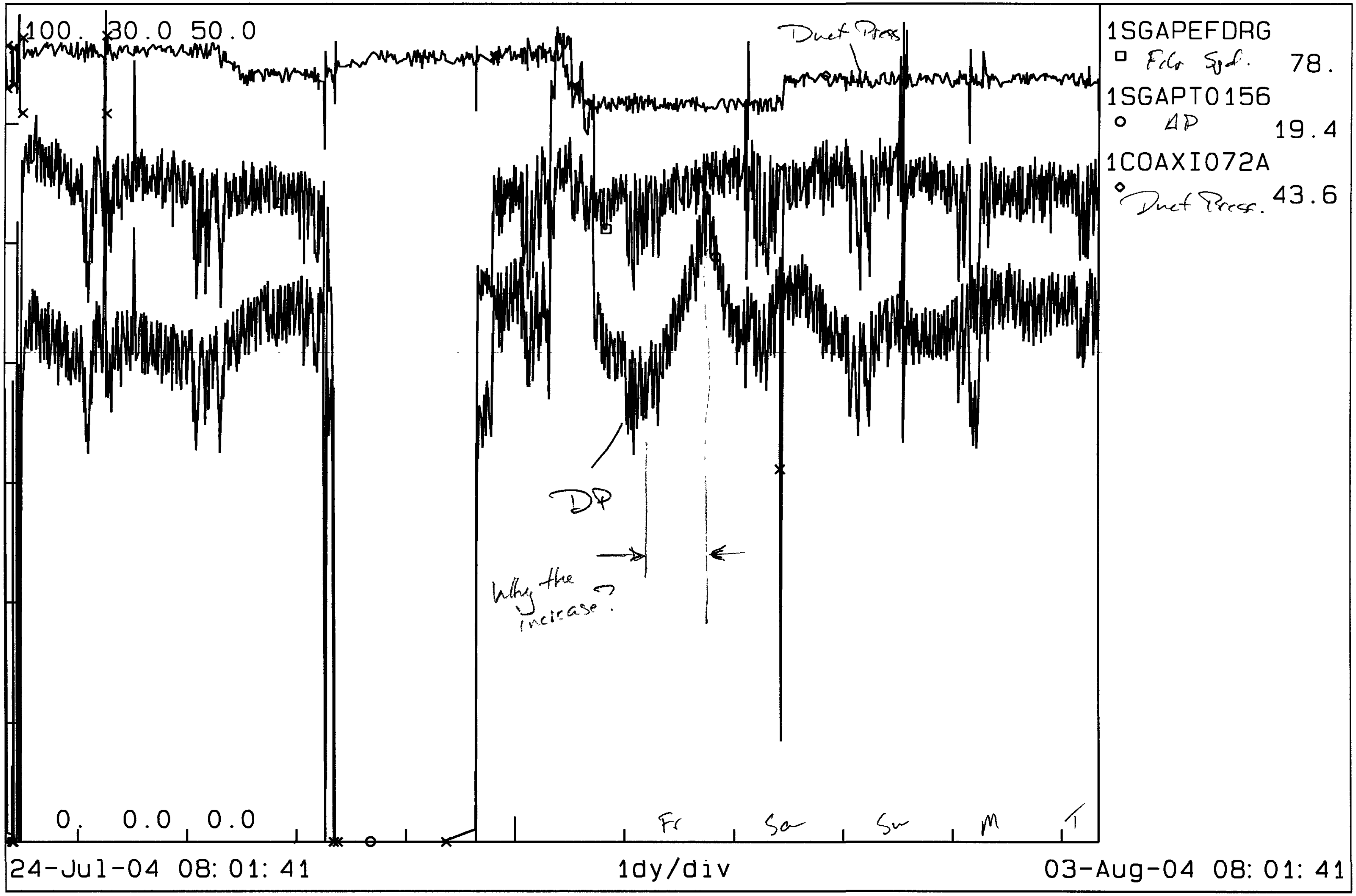
Unit 1 946.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow372.3TPH	52.6	55.1	54.5	BadI	53.9	50.6	61.7	53.3
Feeder Speed	78.0	81.4	78.3	Calc	79.1	75.0	90.6	79.0
Amps (Duct Pr44.()	58.2	64.2	64.2	0.0	66.9	53.9	51.7	64.5
Coal Pipe Vel	4112.	4014.	4273.	4.	4307.	4338.	3995.	4353.
PA Flow %	92.7	91.4	98.3	0.1	98.4	99.8	89.1	98.5
PA Damper Pos	83.6	80.7	80.4	1.3	86.3	90.7	100.	84.9
SA Damper Pos	75.2	75.5	78.8	10.0	75.3	74.2	87.1	70.9
PA Mass Flow	3677.	3581.	3813.	4.	3911.	3910.	3506.	3890.
Pulv DP (NOx 0.37)	17.0	11.8	13.8	0.0	15.4	17.4	23.7	14.8
Air to Fuel Ratio	2.08	1.94	2.15	Calc	2.16	2.30	1.73	2.18
Pulv Inlet Temp	282.2	290.7	288.5	120.9	270.9	281.4	342.2	300.6
Pulv Outlet Temp	150.1	151.1	150.6	90.0	151.1	149.7	150.9	150.6
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-4.0
Air Bias	4.8	0.0	7.7	6.6	8.1	11.1	0.1	9.3
Hyd Skid Pr Fdbk	7.	2246.	2261.	2.	2133.	4.	2167.	2332.
Hyd Skid Pr Setpt	2334.	2400.	2400.	1149.	2358.	2260.	2400.	2361.

EndTim= 03-Aug-04 15:24:22 /EvalTim= 03-Aug-04 15:24:22 /PanRate= 0

IP12_002958

Printed out for: UNIT1OP - 03-Aug-04 07:52:14 B&W Rot. Throat.

0 Messages U1 Pulv U1 Pulv Operating data 1 G Mill 03-Aug-04 07:52:14



EndTim= 03-Aug-04 07:52:14 /EvalTim= 03-Aug-04 07:52:14 /PanRate= 0

IP12_002959

[redacted]inted out for: UNIT1OP - 27-Aug-04 15:09:00 B&W Rotating G Mill

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 15:09:00

Unit 1 954.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow358.3TPH	47.2	48.6	48.4	48.6	50.5	45.3	65.8	47.4
Feeder Speed	71.0	74.1	73.5	73.2	74.3	67.6	96.7	72.1
Amps (Duct Pr44.7)	57.2	66.0	69.0	69.5	0.0	54.9	55.2	70.5
Coal Pipe Vel	4133.	3879.	4106.	4101.	6.	4007.	3833.	4033.
PA Flow %	93.6	87.4	92.3	91.8	0.1	90.6	86.8	91.0
PA Damper Pos	77.6	77.2	72.2	69.6	1.0	74.7	100.	75.7
SA Damper Pos	62.6	62.9	66.4	63.1	10.0	61.9	92.5	59.7
PA Mass Flow	3712.	3476.	3686.	3673.	5.	3611.	3412.	3625.
Pulv DP (NOx 0.41)	14.5	10.9	11.6	12.4	0.2	13.6	24.2	10.6
Air to Fuel Ratio	2.26	2.06	2.27	2.22	0.00	2.36	1.55	2.22
Pulv Inlet Temp	289.7	302.9	291.9	286.3	110.0	286.0	361.5	300.9
Pulv Outlet Temp	149.7	151.1	150.6	152.3	102.9	148.6	150.6	150.8
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-3.0
Air Bias	6.9	0.0	5.6	4.8	4.1	5.1	0.1	4.9
Hyd Skid Pr Fdbk	1.	2247.	0.	2098.	2144.	2.	2273.	2113.
Hyd Skid Pr Setpt	2136.	2187.	2181.	2194.	2241.	2065.	2400.	2142.

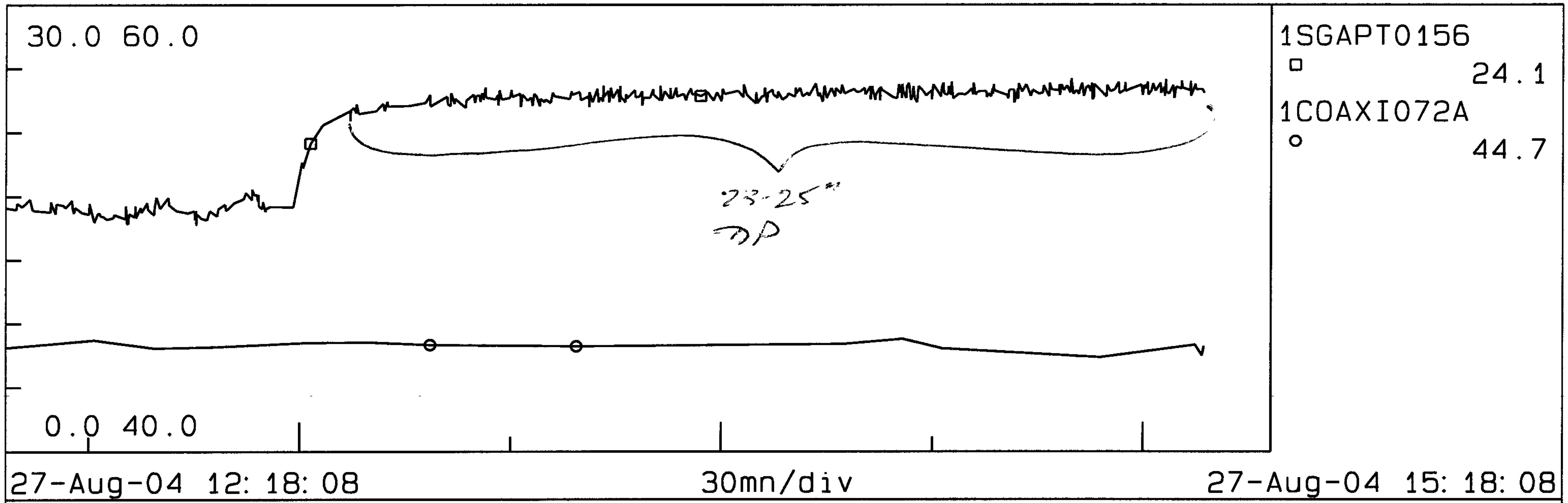
EndTim= 27-Aug-04 15:09:00 /EvalTim= 27-Aug-04 15:09:00 /PanRate= 0

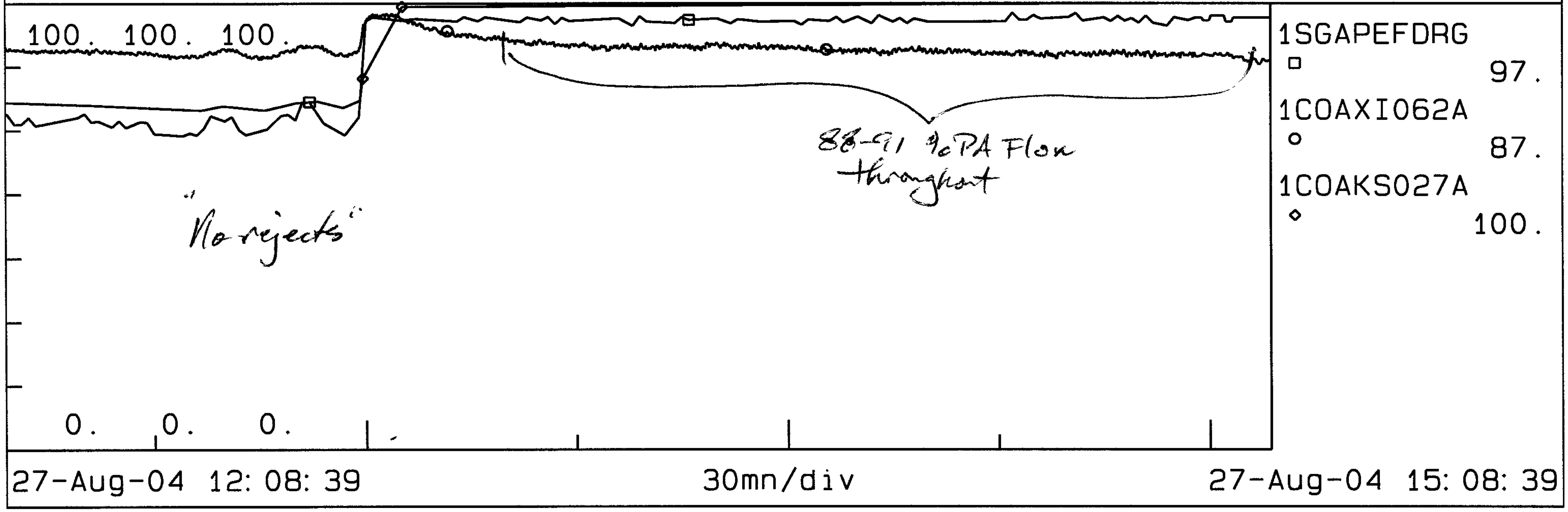
End of Test

IP12_002960

[redacted]inted out for: UNIT1OP - 27-Aug-04 15:08:50

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 15:08:50





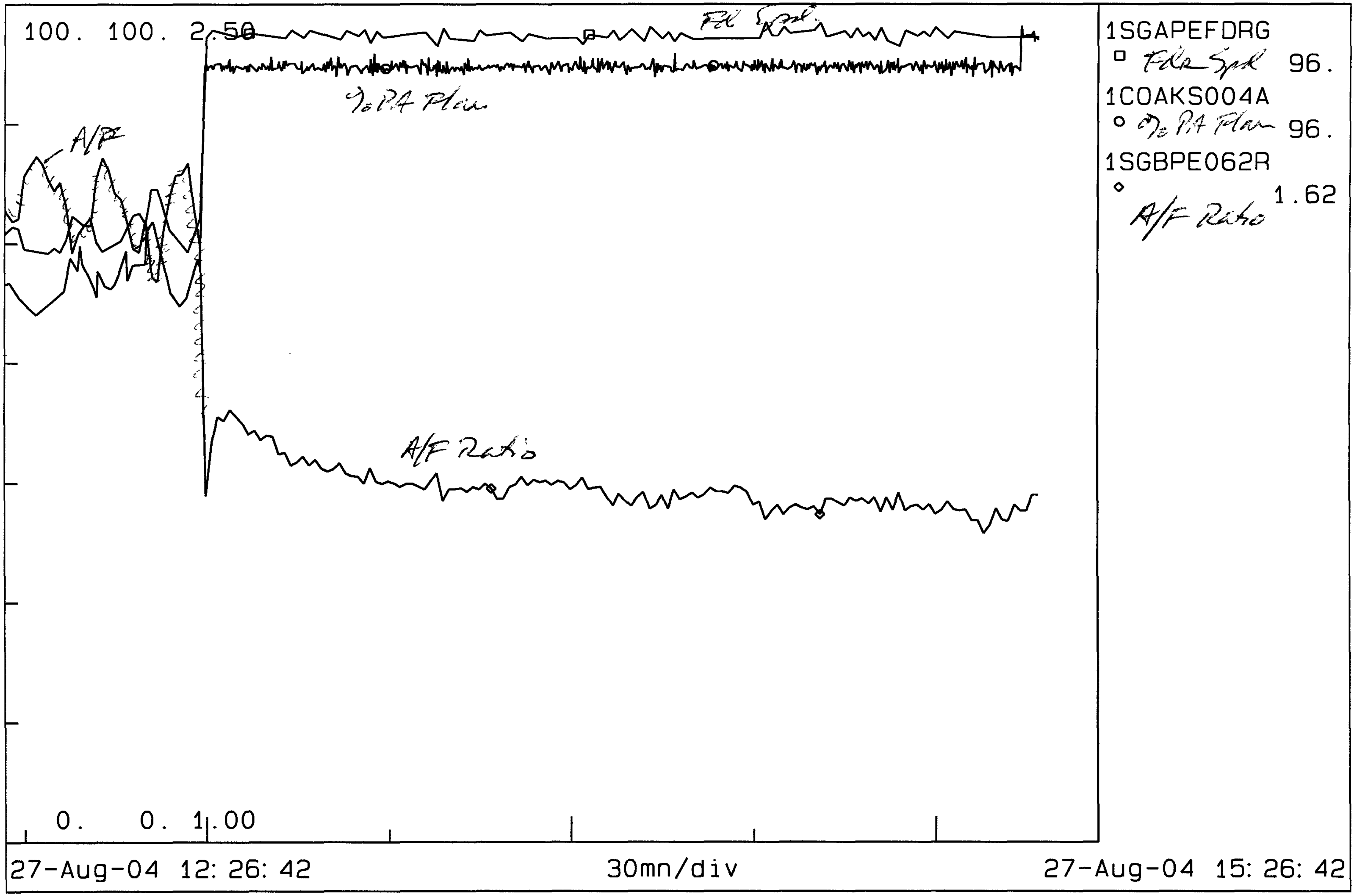
EndTim= 27-Aug-04 15:08:50 /EvalTim= 27-Aug-04 15:08:50 /PanRate= 0

Ran for 2 hours. Held steady. Wheel guards were trimmed yesterday.

IP12_002961

Printed out for: UNIT1OP - 27-Aug-04 15:17:00

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 15:17:00



EndTim= 27-Aug-04 15:17:00 /EvalTim= 27-Aug-04 15:17:00 /PanRate= 0

IP12_002962

[redacted]nted out for: UNIT1OP   - 27-Aug-04 14:31:48   B&W G Mill Rotating

0 Messages U1 Pulv   U1 Pulv Operating data   27-Aug-04 14:31:48

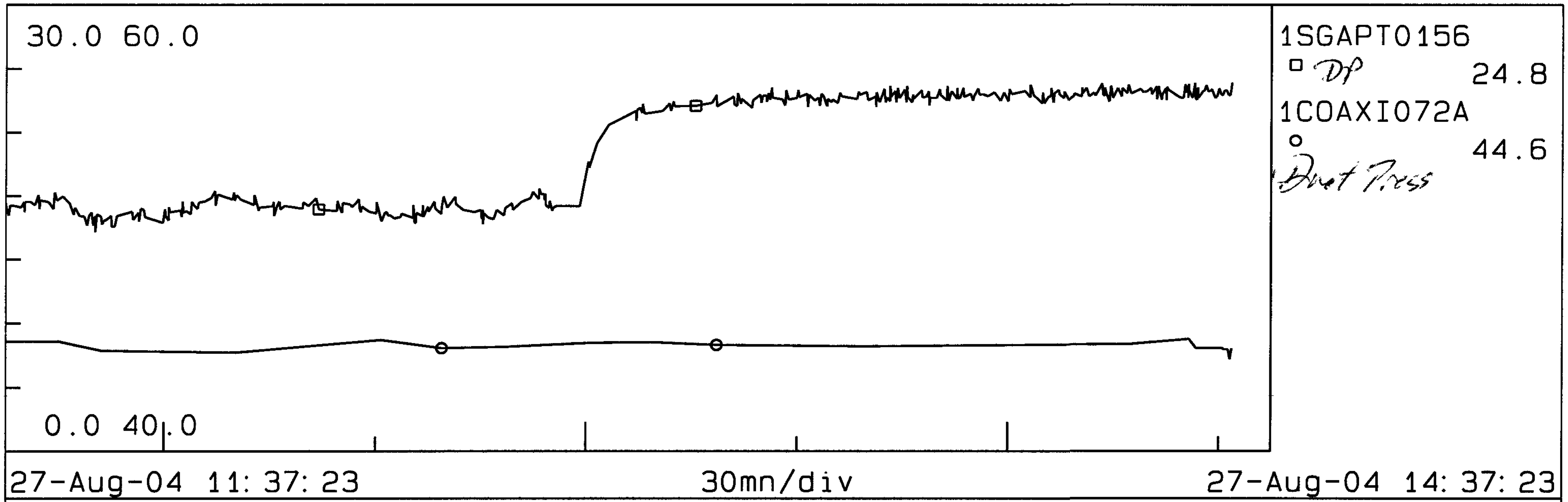
Unit 1 950.0 MW	Pulv A	Pulv B	Tech Pulv C	Pulv D	BPI Pulv E	Pulv F	Pulv G	B&W Pulv H
Coal Flow361.4TPH	48.8	51.4	50.3	50.1	50.5	46.6	66.1	49.8
Feeder Speed	72.4	75.2	73.1	73.7	74.3	68.8	96.2	73.2
Amps (Duct Pr44.1)	56.5	70.7	69.7	68.9	0.0	56.0	53.7	71.7
Coal Pipe Vel	4158.	3909.	4119.	4094.	6.	4033.	3930.	4033.
PA Flow %	93.8	89.2	93.1	93.1	0.1	91.5	88.6	92.0
PA Damper Pos	78.1	77.8	73.0	71.2	1.0	75.8	100.	76.6
SA Damper Pos	66.4	67.0	70.2	66.9	10.0	65.3	93.1	63.5
PA Mass Flow	3704.	3511.	3704.	3673.	5.	3637.	3498.	3640.
Pulv DP (NOx 0.40)	15.3	11.2	12.3	13.0	0.2	14.6	24.6	11.5
Air to Fuel Ratio	2.26	2.07	2.25	2.20	0.00	2.33	1.61	2.19
Pulv Inlet Temp	296.9	305.7	295.7	289.6	106.8	287.2	365.9	299.9
Pulv Outlet Temp	150.1	151.5	150.6	152.0	99.6	148.4	150.6	148.9
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-3.0
Air Bias	6.9	0.0	5.6	4.8	4.1	5.1	0.1	4.9
Hyd Skid Pr Fdbk	0.	2228.	0.	2099.	2143.	2.	2278.	2201.
Hyd Skid Pr Setpt	2196.	2289.	2250.	2252.	2241.	2113.	2400.	2237.

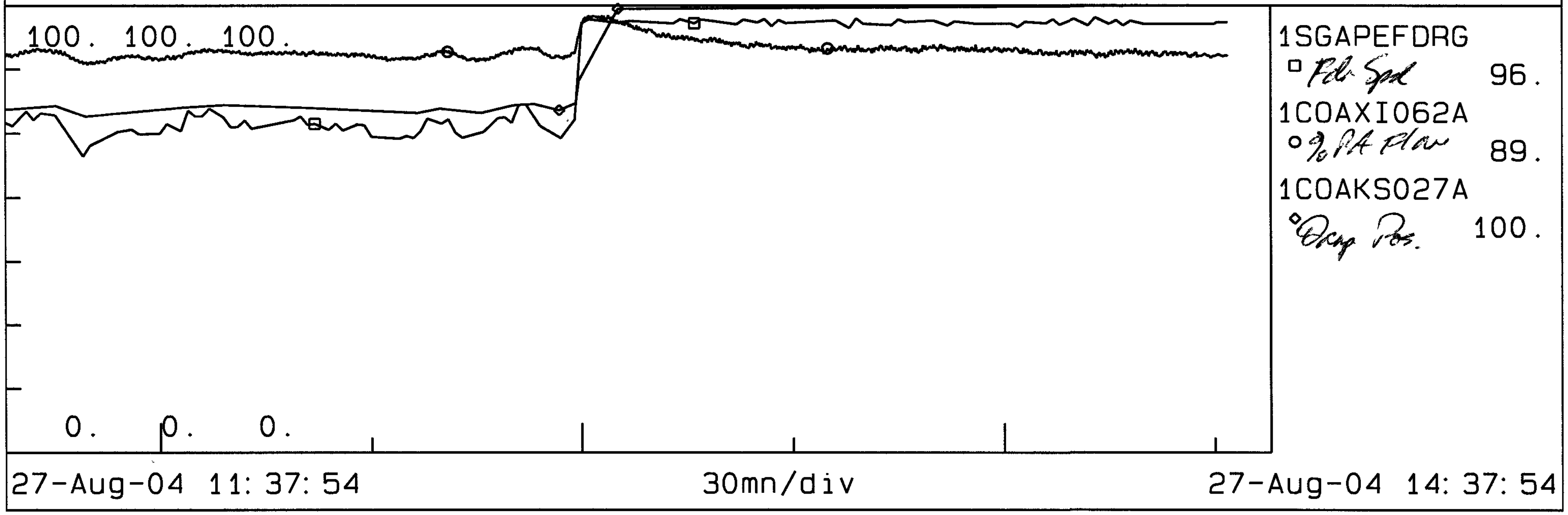
EndTim= 27-Aug-04 14:31:48 /EvalTim= 27-Aug-04 14:31:48 /PanRate= 0

Mid-Test

IP12_002963

inted out for: UNIT1OP - 27-Aug-04 14:31:57
0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 14:31:57





EndTim= 27-Aug-04 14:31:57 /EvalTim= 27-Aug-04 14:31:57 /PanRate= 0

[redacted] Printed out for: UNIT1OP - 27-Aug-04 10: 33: 09

ID Stationary.

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 10: 33: 09

Unit 1 949.5 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow359.3TPH	47.9	50.6	50.0	65.3	50.5	47.2	49.2	49.8
Feeder Speed	70.6	74.8	73.4	96.3	74.3	70.0	73.2	71.8
Amps (Duct Pr44.7)	58.7	70.9	74.2	69.7	0.0	54.0	44.2	69.4
Coal Pipe Vel	4170.	3860.	4081.	4148.	6.	4002.	3885.	4041.
PA Flow %	94.6	88.6	93.1	92.9	0.1	90.9	88.3	91.8
PA Damper Pos	77.9	77.5	72.8	100.	1.0	75.2	76.5	76.3
SA Damper Pos	66.2	70.3	69.9	93.1	10.0	66.4	70.0	63.2
PA Mass Flow	3735.	3499.	3691.	3683.	5.	3612.	3495.	3640.
Pulv DP (NOx 0.39)	14.2	10.6	11.9	22.5	0.0	14.1	15.8	11.2
Air to Fuel Ratio	2.33	2.06	2.20	1.69	0.00	2.28	2.11	2.23
Pulv Inlet Temp	289.9	298.7	282.8	319.9	99.0	282.2	318.9	300.4
Pulv Outlet Temp	149.4	150.9	149.7	152.5	99.3	148.0	150.0	149.7
Coal Bias	0.0	0.0	0.0	0.0	0.0	-3.0	0.0	-3.0
Air Bias	6.9	0.0	5.6	4.8	4.1	4.5	0.1	4.9
Hyd Skid Pr Fdbk	0.	2221.	0.	2111.	2146.	1.	4.	2186.
Hyd Skid Pr Setpt	2171.	2260.	2238.	2400.	2240.	2174.	2208.	2231.

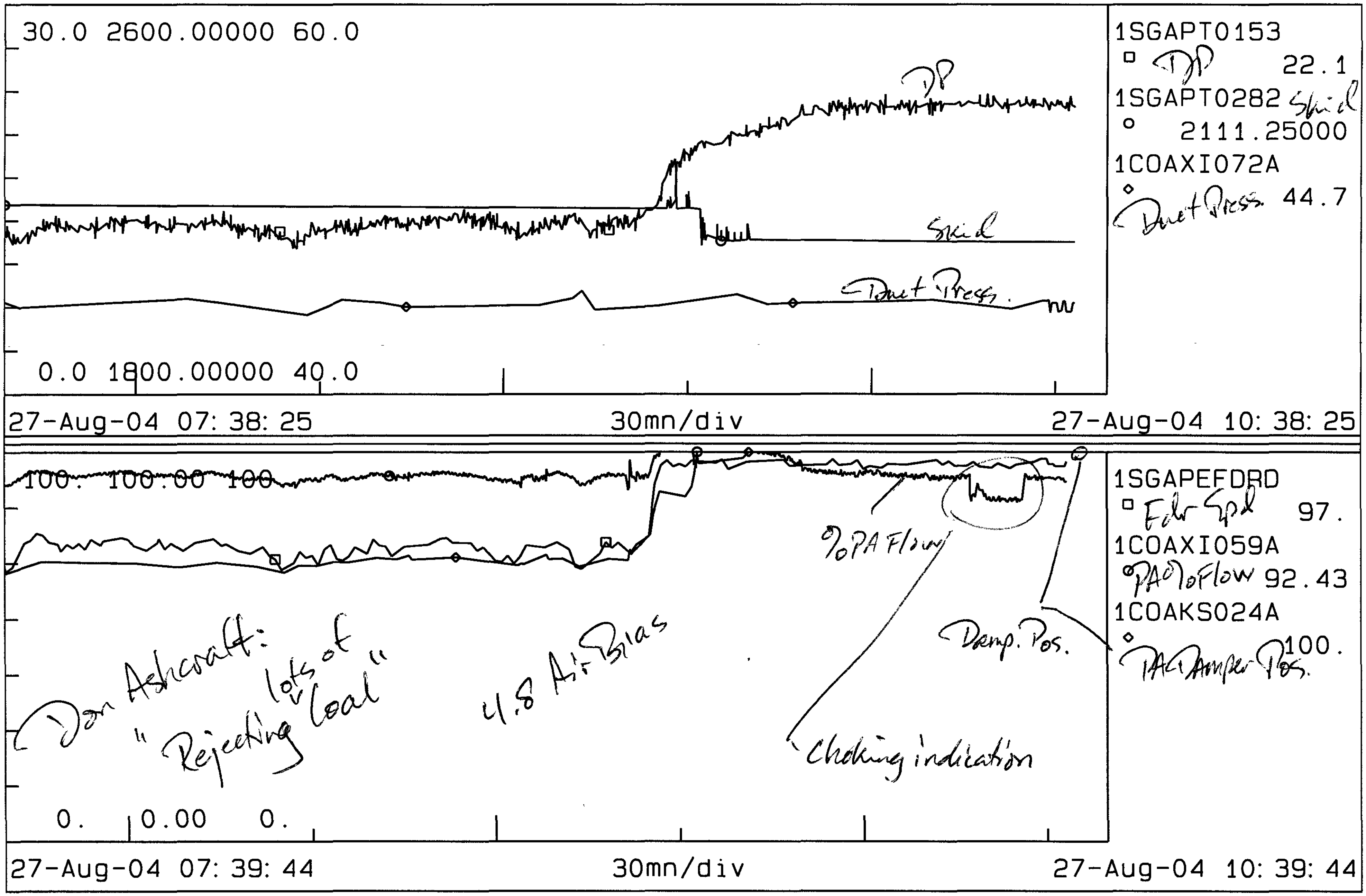
EndTim= 27-Aug-04 10: 33: 09 /EvalTim= 27-Aug-04 10: 33: 09 /PanRate= 0

Rebuild just completed. - last week.

Printed out for: UNIT1OP - 27-Aug-04 10:33:27

Unit 1D Stationary

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 10:33:27



EndTim= 27-Aug-04 10:33:27 /EvalTim= 27-Aug-04 10:33:27 /PanRate= 0

Choking indication and rejecting lots of coal.

IP12_002966

Printed out for: UNIT1OP - 27-Aug-04 13:28:44

16 Rotating Throat

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 13:28:44

Good Coal

Unit 1 948.3 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow355.7TPH	48.7	50.0	49.0	49.9	50.5	45.6	65.5	48.8
Feeder Speed	71.5	74.3	72.6	74.3	74.3	69.0	96.8	73.4
Amps (Duct Pr44.7)	58.9	67.0	71.7	69.0	0.0	53.4	51.7	69.2
Coal Pipe Vel	4144.	3864.	4087.	4110.	6.	3975.	4054.	4044.
PA Flow %	94.7	88.3	93.1	92.7	0.2	91.5	90.5	91.7
PA Damper Pos	77.6	77.3	72.4	70.2	1.0	74.4	100.	75.9
SA Damper Pos	65.3	65.5	69.0	65.7	10.0	64.2	92.2	62.4
PA Mass Flow	3725.	3469.	3671.	3673.	6.	3584.	3573.	3624.
Pulv DP (NOx 0.41)	14.4	10.6	11.3	12.6	0.0	13.5	23.9	10.9
Air to Fuel Ratio	2.30	2.06	2.22	2.18	0.00	2.29	1.65	2.18
Pulv Inlet Temp	289.4	298.8	286.6	287.4	104.5	286.9	367.8	304.6
Pulv Outlet Temp	149.4	151.1	150.1	152.3	97.1	148.6	150.8	150.9
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-3.0
Air Bias	6.9	0.0	5.6	4.8	4.1	5.1	0.1	4.9
Hyd Skid Pr Fdbk	0.	2189.	0.	2102.	2129.	2.	2222.	2187.
Hyd Skid Pr Setpt	2191.	2238.	2199.	2228.	2241.	2081.	2400.	2194.

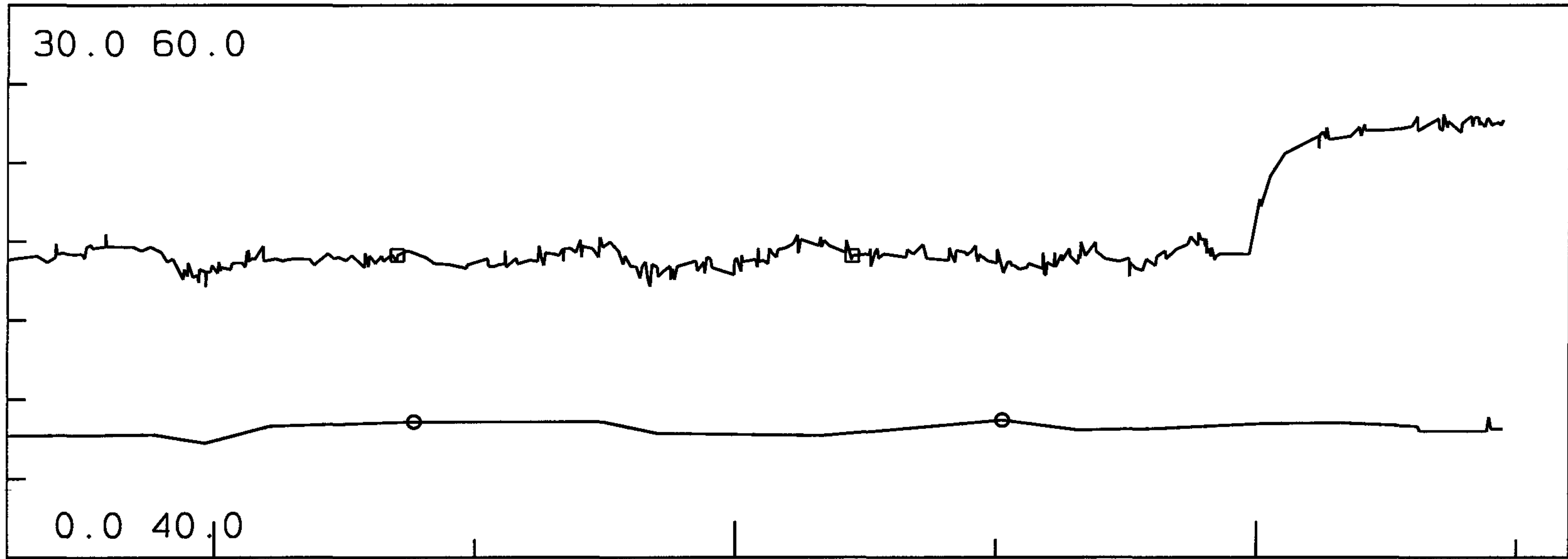
EndTim= 27-Aug-04 13:28:44 /EvalTim= 27-Aug-04 13:28:44 /PanRate= 0

Mill-Test

IP12_002967

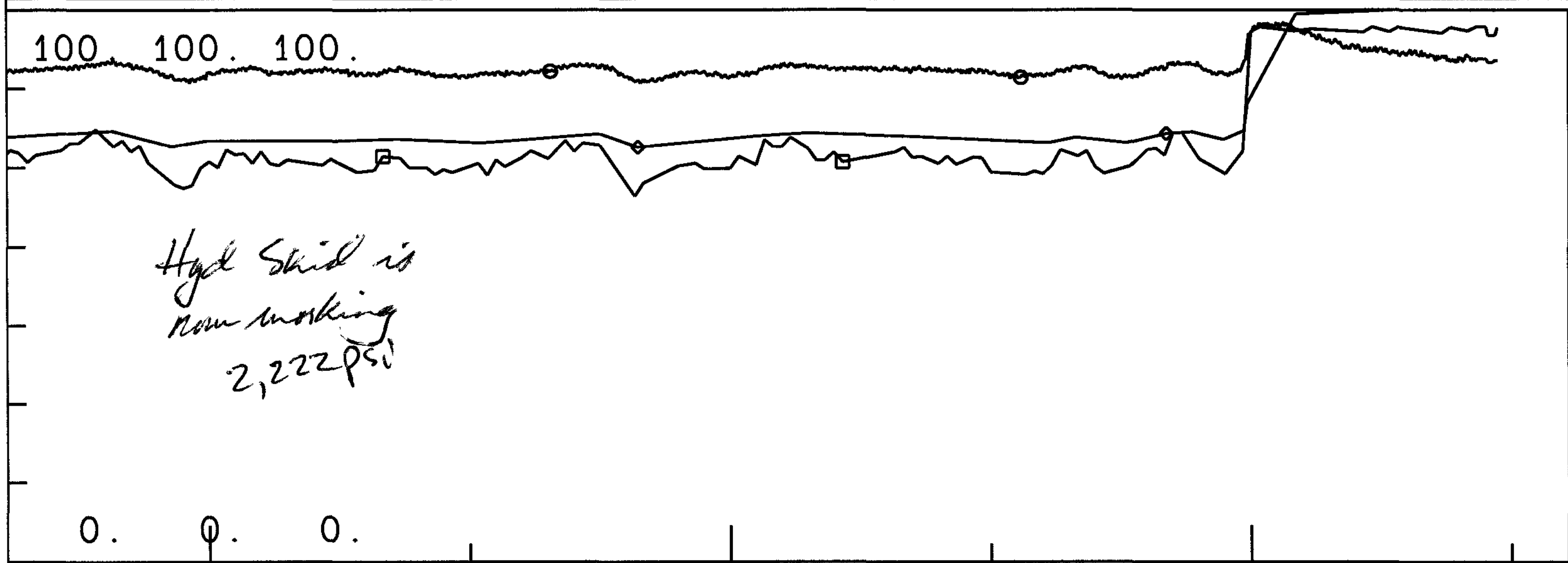
Printed out for: UNIT1OP - 27-Aug-04 13:28:39

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 13:28:39



1SGAPT0156
□ Dp 23.8
1COAXI072A
○ Duct Press 44.7

27-Aug-04 10:36:02 30mn/div 27-Aug-04 13:36:02



1SGAPEFDRG
□ Fdr Spd 97.
1COAXI062A
○ % PA Flow 91.
1COAKS027A
◇ Damp. Pos. 100.

27-Aug-04 10:36:34 30mn/div 27-Aug-04 13:36:34

EndTim= 27-Aug-04 13:28:39 /EvalTim= 27-Aug-04 13:28:39 /PanRate= 0

IP12_002968

Printed out for: UNIT1OP - 27-Aug-04 12:57:20

16 Mill Rot. B&W

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 12:57:20

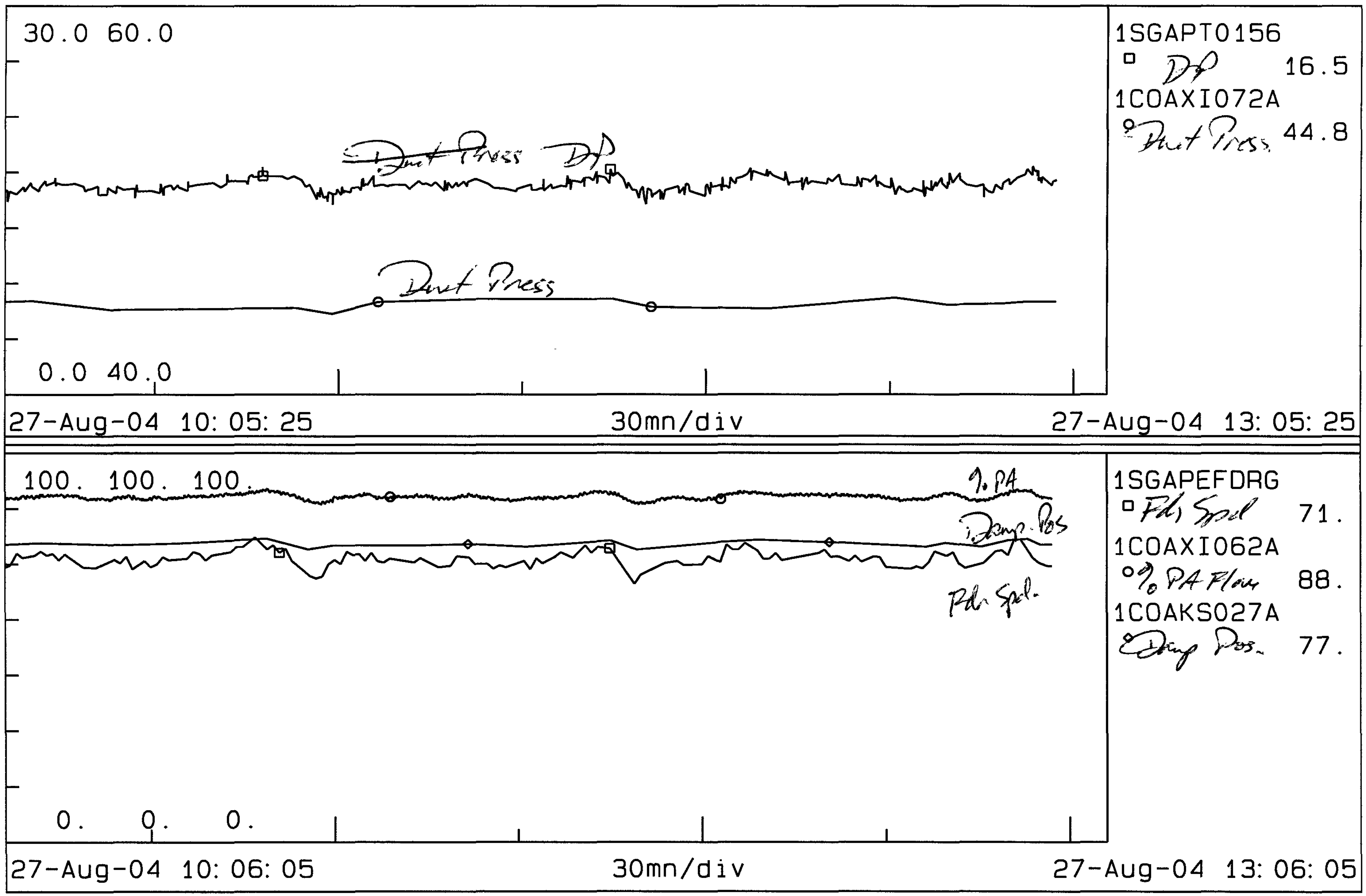
Unit 1 948.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow350.2TPH	47.3	48.8	48.5	48.7	50.5	44.9	48.3	48.1
Feeder Speed	69.6	73.6	72.0	72.4	74.3	65.6	71.0	70.1
Amps (Duct Pr44.8)	57.4	67.9	70.5	72.9	0.0	54.4	44.2	73.0
Coal Pipe Vel	4069.	3941.	4088.	4144.	5.	4149.	3935.	4103.
PA Flow %	93.5	87.7	92.4	92.3	0.1	93.0	88.4	90.9
PA Damper Pos	78.0	77.0	72.3	70.0	1.0	80.7	76.1	75.8
SA Damper Pos	64.1	64.3	67.8	64.5	10.0	62.0	64.1	61.1
PA Mass Flow	3671.	3467.	3677.	3671.	5.	3716.	3533.	3605.
Pulv DP (NOx 0.35)	14.4	11.0	11.3	12.7	0.0	16.7	16.5	11.3
Air to Fuel Ratio	2.33	2.13	2.25	2.24	0.00	2.50	2.20	2.31
Pulv Inlet Temp	306.7	306.8	294.0	295.5	102.7	301.8	320.8	305.9
Pulv Outlet Temp	150.1	151.5	150.1	152.3	97.3	151.5	150.9	149.7
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	-3.0
Air Bias	6.9	0.0	5.6	4.8	4.1	5.1	0.1	4.9
Hyd Skid Pr Fdbk	0.	2196.	0.	2107.	2133.	1.	~~4.~~	2116.
Hyd Skid Pr Setpt	2139.	2194.	2184.	2189.	2241.	2052.	2175.	2168.

EndTim= 27-Aug-04 12:57:20 /EvalTim= 27-Aug-04 12:57:20 /PanRate= 0 Locked down

Pre-Test

IP12_002969

Printed out for: UNIT1OP - 27-Aug-04 12:57:26
0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 12:57:26



EndTim= 27-Aug-04 12:57:26 /EvalTim= 27-Aug-04 12:57:26 /PanRate= 0

Beginning of test.

Printed out for: UNIT1OP - 27-Aug-04 12:00:09 1B Stationary.

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 12:00:09

Unit 1 949.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow356.9TPH	47.5	66.3	48.8	49.6	50.5	45.6	48.8	48.4
Feeder Speed	70.1	98.1	72.5	72.8	74.3	68.0	71.2	72.2
Amps (Duct Pr44.4)	57.0	68.5	69.9	69.2	0.0	54.4	43.7	68.9
Coal Pipe Vel	4173.	4406.	4073.	4065.	6.	3989.	3865.	4026.
PA Flow %	94.8	99.7	92.6	91.9	0.1	90.8	87.8	91.1
PA Damper Pos	77.0	98.9	72.3	69.7	1.0	74.7	76.0	75.7
SA Damper Pos	64.9	93.5	68.6	65.3	10.0	65.2	64.9	61.9
PA Mass Flow	3746.	3955.	3667.	3649.	5.	3603.	3480.	3615.
Pulv DP (NOx 0.41)	14.6	19.6	12.2	11.6	0.0	14.1	15.6	11.1
Air to Fuel Ratio	2.36	1.77	2.23	2.21	0.00	2.34	2.14	2.21
Pulv Inlet Temp	288.6	326.9	284.9	286.3	99.3	281.9	314.1	304.5
Pulv Outlet Temp	148.9	151.1	149.7	151.5	97.5	147.8	149.7	150.9
Coal Bias	0.0	0.0	0.0	0.0	0.0	-3.0	0.0	-3.0
Air Bias	6.9	0.0	5.6	4.8	4.1	4.5	0.1	4.9
Hyd Skid Pr Fdbk	0.	2265.	0.	2111.	2144.	1.	5.	2152.
Hyd Skid Pr Setpt	2147.	2400.	2194.	2219.	2240.	2077.	2193.	2178.

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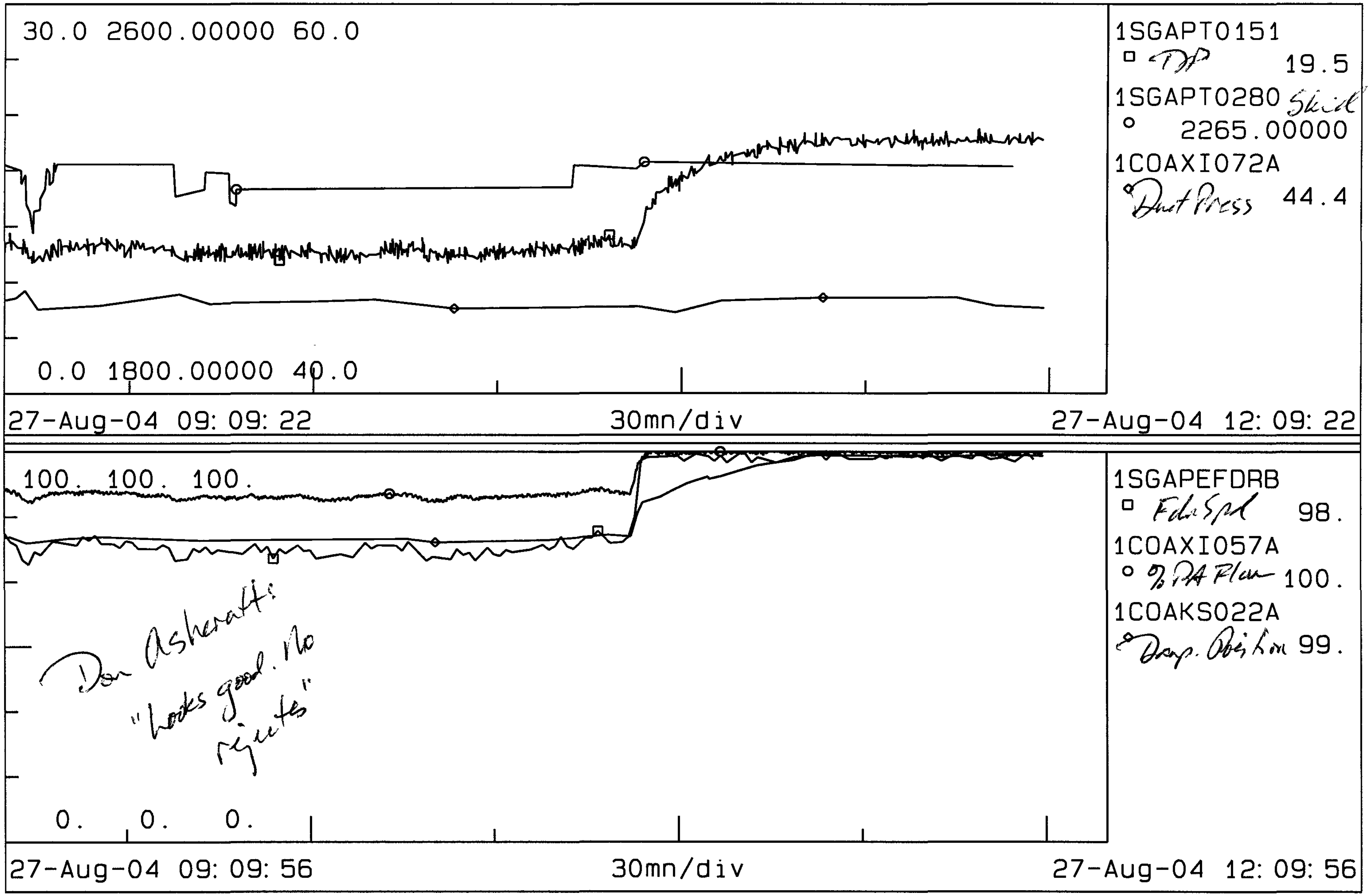
Rebuilt within the last year.

IP12_002971

Printed out for: UNIT1OP - 27-Aug-04 12:00:04 1B Stationary

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 12:00:04



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Ran good and no rejects. No choking.

IP12_002972

Printed out for: UNIT1OP - 27-Aug-04 09:26:01 1D Stationary

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 09:26:01

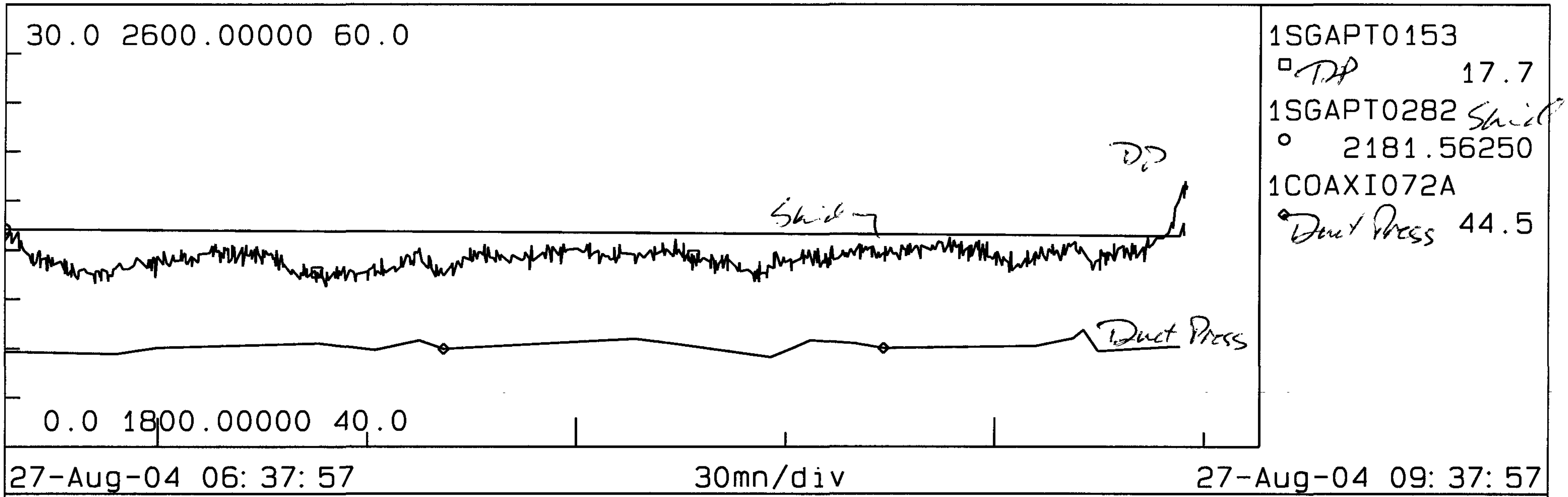
Unit 1 943.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow 358.5 TPH	51.0	52.6	52.2	60.4	50.6	49.2	51.3	52.3
Feeder Speed	75.1	78.6	76.6	78.3	74.3	72.9	76.9	76.6
Amps (Duct Pr 44.5)	58.2	67.5	65.9	71.5	0.0	53.7	45.4	67.0
Coal Pipe Vel	4090.	3942.	4170.	4112.	5.	4061.	3954.	4070.
PA Flow %	92.1	89.9	94.3	96.3	0.1	92.3	89.5	93.1
PA Damper Pos	79.6	79.1	74.1	82.0	1.0	78.5	78.4	77.6
SA Damper Pos	70.1	70.3	73.8	84.9	10.0	70.4	70.2	67.2
PA Mass Flow	3687.	3541.	3746.	3693.	5.	3662.	3554.	3666.
Pulv DP (NOx 0.39)	14.4	11.6	12.7	15.2	0.0	14.8	16.4	11.6
Air to Fuel Ratio	2.17	1.99	2.16	2.08	0.00	2.21	2.04	2.10
Pulv Inlet Temp	294.6	302.4	283.8	288.3	104.3	290.7	322.7	299.5
Pulv Outlet Temp	148.9	150.6	149.7	152.3	101.3	148.1	150.0	149.4
Coal Bias	0.0	0.0	0.0	0.0	0.0	-3.0	0.0	-3.0
Air Bias	6.9	0.0	5.6	4.8	4.1	4.5	0.1	4.9
Hyd Skid Pr Fdbk	0.	2270.	0.	2183.	2164.	1.	13.	2281.
Hyd Skid Pr Setpt	2268.	2346.	2321.	2400.	2241.	2210.	2301.	2306.

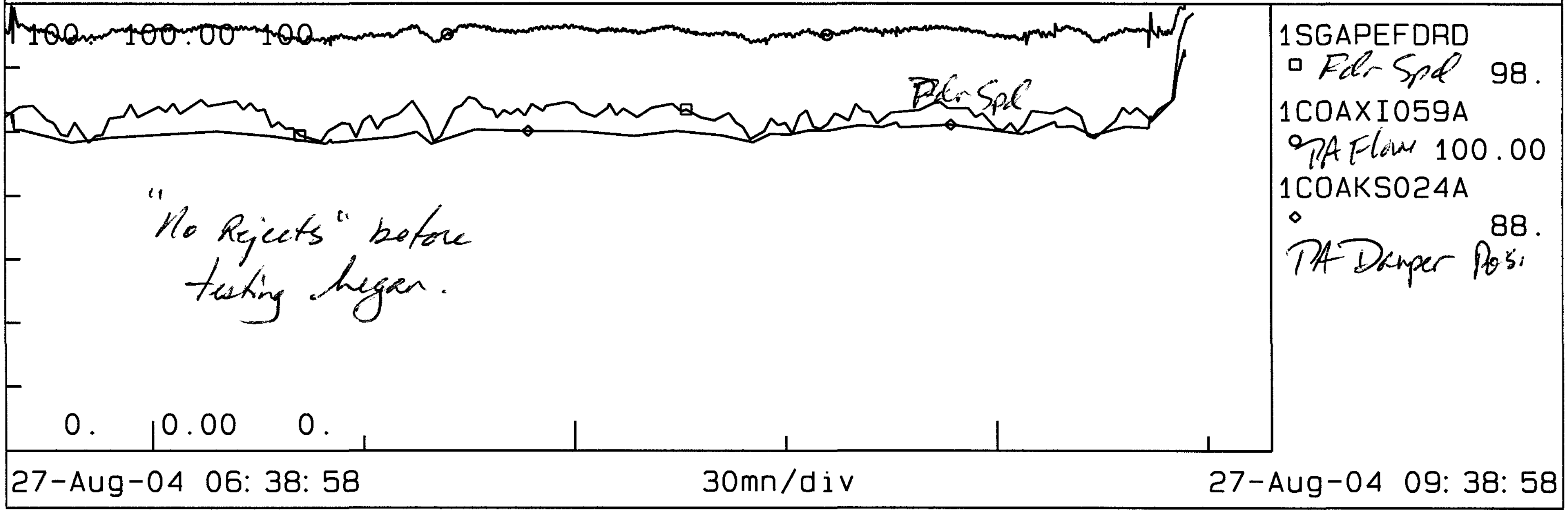
EndTim= 27-Aug-04 09:26:01 /EvalTim= 27-Aug-04 09:26:01 /PanRate= 0

IP12_002973

Printed out for: UNIT1OP - 27-Aug-04 09:29:14

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 09:29:14





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IP12_002974

Printed out for: UNIT1OP - 27-Aug-04 12:47:39 IF Stationary Throat

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 12:47:39

Unit 1 949.5MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow359.0TPH	49.2	50.7	49.9	50.1	50.5	65.2	49.8	50.3
Feeder Speed	71.5	75.3	73.1	72.4	74.3	96.1	72.8	72.1
Amps (Duct Pr44.5)	57.5	63.9	67.5	69.4	0.0	64.9	45.2	70.7
Coal Pipe Vel	4153.	3866.	4070.	4061.	5.	3864.	3944.	4009.
PA Flow %	94.3	88.7	93.5	92.9	0.1	88.4	88.3	91.6
PA Damper Pos	78.1	77.5	72.8	70.8	1.0	100.	76.5	76.2
SA Damper Pos	67.3	67.6	71.2	67.8	10.0	96.5	67.3	64.6
PA Mass Flow	3734.	3473.	3664.	3641.	5.	3490.	3495.	3610.
Pulv DP (NOx 0.37)	14.5	10.5	12.0	12.1	0.0	22.2	15.9	10.3
Air to Fuel Ratio	2.30	2.05	2.21	2.20	0.00	1.61	2.11	2.18
Pulv Inlet Temp	298.2	301.5	293.3	292.1	102.7	356.9	320.8	304.0
Pulv Outlet Temp	150.9	151.9	150.9	152.8	97.3	148.3	150.9	150.1
Coal Bias	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.0
Air Bias	6.9	0.0	5.6	4.8	4.1	0.0	0.1	4.9
Hyd Skid Pr Fdbk	0.	2225.	0.	2107.	2133.	~~2.~~	5.	2218.
Hyd Skid Pr Setpt	2209.	2264.	2234.	2247.	2240.	2400.	2231.	2250.

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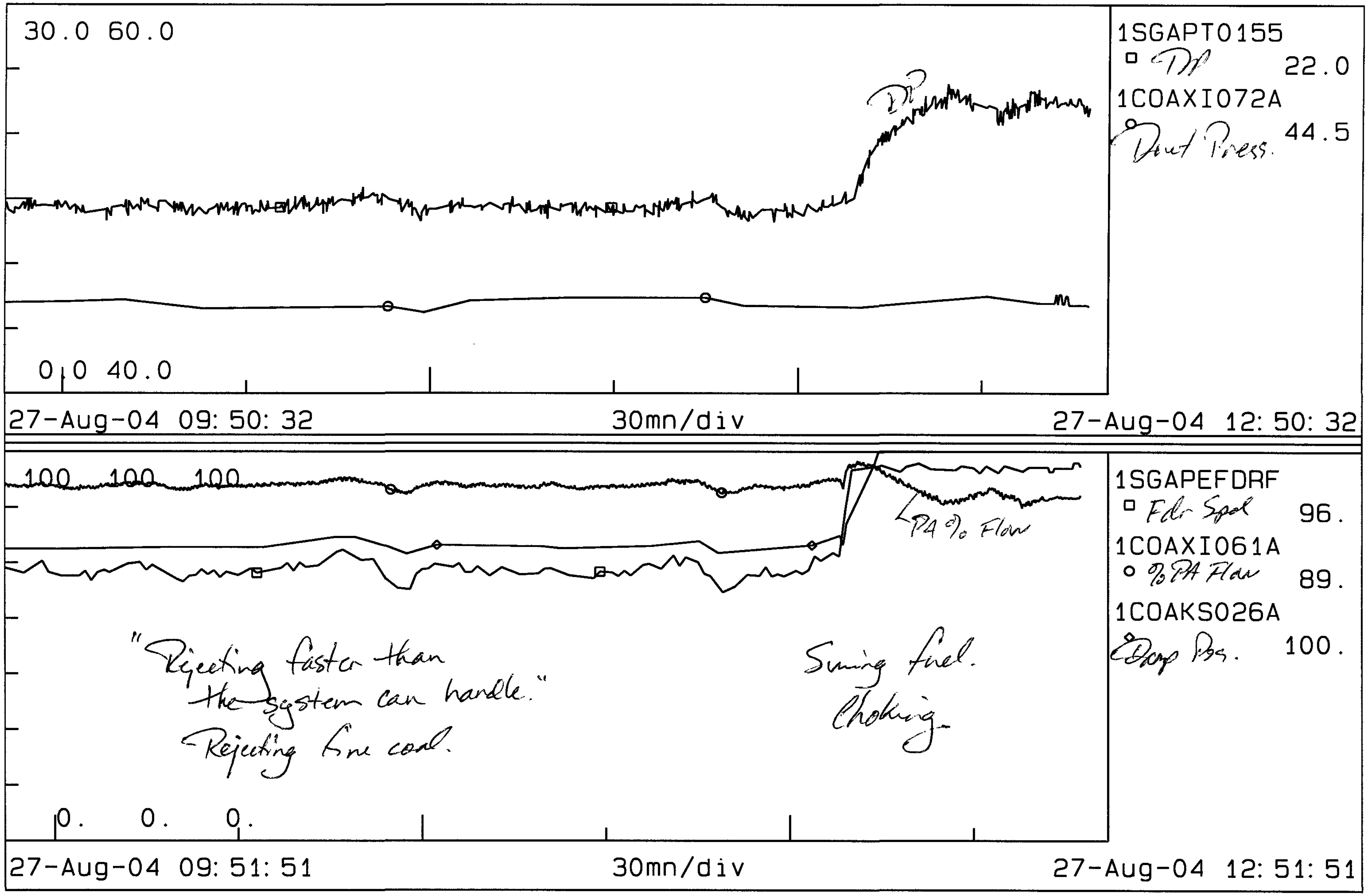
IP12_002975

Printed out for: UNIT1OP - 27-Aug-04 12:47:28

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 12:47:28



EndTim= 27-Aug-04 12:47:28 /EvalTim= 27-Aug-04 12:47:28 /PanRate= 0

IP12_002976

From: jcpugh@babcock.com
To: Phil Hailes
Subject: Request For Info & Quote Cast Low Pressure Drop Rotating Throat Assembly Intermountain Power RB

Phil,

Per your request, I have attached a write-up describing B&W's latest design rotating throat assembly which we refer to as our Cast Low Pressure Drop Rotating Throat Assembly.

I have also attached a copy of a document that we refer to as Existing Operating Data B&W Roll Wheel Type Pulverizer. The information that you provide on this sheet will be used by B&W to determine the port area of the throat assembly that we would supply.

I have also attached a copy of a photograph looking down on top of a section of a Cast Low Pressure Drop Rotating Throat Assembly. Please note that the photograph shows early design segments that are bolted to the top surface of the ring seat ledge. Our current standard design throat segments are welded to the outer perimeter of the ring seat ledge.

By copy to Dan Menster, please arrange to have a quotation sent to Phil for one Cast Low Pressure Drop Rotating Throat Assembly.

If you have additional questions, please call me at 330 860-2889, or Dan Menster at 330 860-1946.

Jeff

Jeff

(F) 330-860-1909

2071

Babcock & Wilcox

Rollwheel Pulverizer

Cast "Low Pressure Drop"

Rotating Throat™ Assembly

Information Booklet

By Jeff Pugh
Marketing Specialist, Pulverizer Upgrades
B&W Service Company
Barberton, Ohio
July 2003

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I. GENERAL DESIGN FEATURES & BENEFITS

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Tests of mills with stationary throats have shown that the flow of air through some ports is as low as 85% of the average port flow on a clean air basis and 75% while the mill is grinding coal. Such poor distribution generally necessitates having to increase air flow above design levels to prevent coal spillage through the ports in which air flow is lowest.

The B&W Rotating Throat™ is designed with a port area that will allow the mill to be operated at design air flow while maintaining good fineness and without experiencing coal spillage.

Insufficient port area will result in excessive throat velocities which will cause higher pressure drop, lower fineness, and increased grinding zone erosion. Decreasing air flow below the design value, to reduce velocities in a throat having an insufficient port area, can result in burner line/nozzle fires, higher inlet air temperatures, and a mill that is slow to respond to changes in load.

A throat having a port area that is too large will necessitate having to operate the mill with higher than design air flows to prevent excessive coal spillage. Since the rotating throat will be sized to allow operation at design air flow, the potential reduction in air flow will yield lower velocities in the mill as well as in the burner pipes/nozzles. These lower velocities will result in reduced erosion and higher fineness.

The aerodynamic features of the B&W Rotating Throat™ assembly are very important in minimizing erosive wear of the throat and grinding zone components.

Non uniform air flow in a throat port can result in turbulence and stagnant zones at the port exit. As coal spills over the edge of the ring seat, it can drop down into a low velocity or stagnant area in the port causing erosion of the upper throat and ledge cover.

The B&W Rotating Throat™ incorporates a patented air foil vane design which promotes more uniform air flow within the port, resulting in the virtual elimination of throat segment wear.

I. GENERAL DESIGN FEATURES & BENEFITS (Cont'd)

Providing more uniform air flow at the port exit allows B&W to supply a throat with a larger port area. In fact, with the B&W rotating throat, the minimum port area is located down in the port away from the exit. The larger exit area results in lower velocities leaving the throat port, which reduces erosive wear of the grinding zone components.

The larger port exit area of the B&W rotating throat also promotes increased fineness, since the lower velocity air leaving the throat is not able to carry as large a particle of coal up to the classifier.

It should also be noted that the installation of B&W Cast "Low Pressure Drop" Rotating Throat™ assemblies has resulted in significant reductions in pulverizer pressure drop.

Even though some customers have realized as much as a 10% reduction in mill power consumption after installing B&W Rotating Throat™ assemblies, other customers have not seen any reduction. Therefore, B&W does not make any claim that our rotating throat will reduce mill power.

Rotating throat assemblies are generally installed along with new grinding elements. Pulverizer power consumption is always lower in mills with new grinding elements compared to those having worn-out elements. Some rotating throat suppliers claim that the installation of their rotating throat will reduce pulverizer power consumption. There is little, if any, evidence to support this claim. In most cases, any reduction in pulverizer power consumption that occurs after installing a rotating throat is the result of installing new grinding elements or reduced fineness.

II. VANE ORIENTATION

The B&W Rotating Throat™ assembly is designed to provide performance benefits at least equal to that obtained with stationary throats while dramatically reducing the maintenance costs associated with stationary throat wear.

The original design B&W Rotating Throat™ assemblies included a vane orientation that promoted CW air flow, the same orientation used with all B&W design stationary throats. A B&W rotating throat with this vane orientation will provide fineness comparable to that obtained with the stationary throat and it also will promote the quick removal of rock and other foreign debris from the grinding zone. However, no reduction in pulverizer pressure drop would be expected after installing an original design B&W Rotating Throat™ with the CW vane orientation.

The primary advantage of a CCW vane orientation is the resultant reduction in mill pressure drop. Tests have indicated that an approximate 2" w.c. reduction in pressure drop across the throat results from orienting the vanes in the CCW direction compared to the CW direction. Additional design features, included with the B&W Cast "Low Pressure Drop" Rotating Throat™ assembly, further reduces the resistance to the flow of air through the mill as is evident by performance data included in the Appendix.

Tests performed by B&W have indicated that in some cases a slight reduction in 200 mesh fineness has resulted after installing a rotating throat with a CCW vane orientation. If fineness does decrease, customers have been able to insert classifier blades to increase recirculation in the mill, thereby improving fineness. The increased pressure drop, due to higher recirculating load, has been more than offset by the reduction in pressure drop resulting from the installation of the B&W Rotating Throat™.

The vane orientation used with the B&W Cast "Low Pressure Drop" Rotating Throat™ is CCW.

III. DESCRIPTION

The Cast "Low Pressure Drop" Rotating Throat assembly includes cast carbon steel throat segments. The upper part of each throat segment is welded to the outer perimeter of the ring seat.

The lower area of each throat segment is attached to the ring seat using a single support clip, which acts as a radial strut. This clip is welded to the throat segment and the ring seat.

The wear resistance of the throat segment is increased by applying chromium carbide weld overlay to the upper area of each vane.

A stationary outer wall assembly includes segments fabricated from carbon steel plate that are seal welded to each other and to the pulverizer housing.

Massive ledge cover castings made from VAM® 20 material are bolted to the top of the stationary outer wall assembly.

<u>It should be noted that since none of the throat components attached to the housing extend over the top of the throat segments, no part of the "Low Pressure Drop" rotating throat assembly requires removal prior to raising the ring seat/yoke assembly to facilitate gear box removal.</u>

IV. TEST DATA DISCUSSION

Data has been included in the Appendix comparing the performance of a mill equipped with a B&W Cast "Low Pressure Drop" rotating throat assembly with CCW vane orientation to a mill with a stationary throat.

Table 1 shows data that was taken from a test report where a B&W-89 Cast "Low Pressure Drop" rotating throat, with cast steel throat segments, was compared to that of a stationary throat at the Northern States Power Company – Sherburne County Plant. It is important to note that the grinding elements used during the stationary throat test were reinstalled with the rotating throat.

As can be seen from this data, there was a significant reduction in mill pressure drop after installing the rotating throat. This should allow the static pressure set point in the duct supplying primary air to the mills to be reduced. This is advantageous to this customer since his primary air fans are somewhat marginal. Reducing the supply duct pressure set point will also reduce primary air heater leakage.

V. BENEFITS

- Increased throat wear life
  - Reduces maintenance costs
  - Maintains operation with design air flow
- Reduced Mill Pressure Drop
  - Potential ability to increase fineness by lengthening existing classifier blades or modifying the louver section to the hi-spin design
  - Potential ability to increase mill capacity if load is presently limited by fan static pressure capability
- No need to remove any portion of the rotating throat assembly when replacing a gear drive.
- Potential reduction of primary air flow due to the ability to operate along design air/fuel curve without coal rejects
  - Lower primary air fan power
  - Reduce erosion of grinding zone components, burner pipes and nozzles
  - Increased fineness

NOTE: Operation of the mill with air flow levels below those specified by B&W is not recommended without prior review by B&W. Insufficient primary air flow can result in burner line/nozzle fires and explosions. As air flow is reduced, the inlet air temperature must be increased to maintain mill outlet temperature. This will result in higher primary air chamber metal temperatures, which increases the risk of mill fires.

VI. SCOPE OF SUPPLY

- 14 cast carbon steel throat segments with chrome carbide weld overlay applied to upper area of each vane
- One fabricated carbon steel outer wall assembly
  Note: An outer wall installation fixture is supplied with the initial throat assembly
- One set of cast VAM 20 ledge cover segments
- 14 support clips
- All required attachment fasteners
- Field alteration drawing

APPENDIX

"Low Pressure Drop" Rotating Throat Assembly Illustration

Table 1: Northern States Power – Pulverizer Performance Data

EXCEL ENERGY
SHERBURNE COUNTY UNIT #3
CONTRACT: RB-566

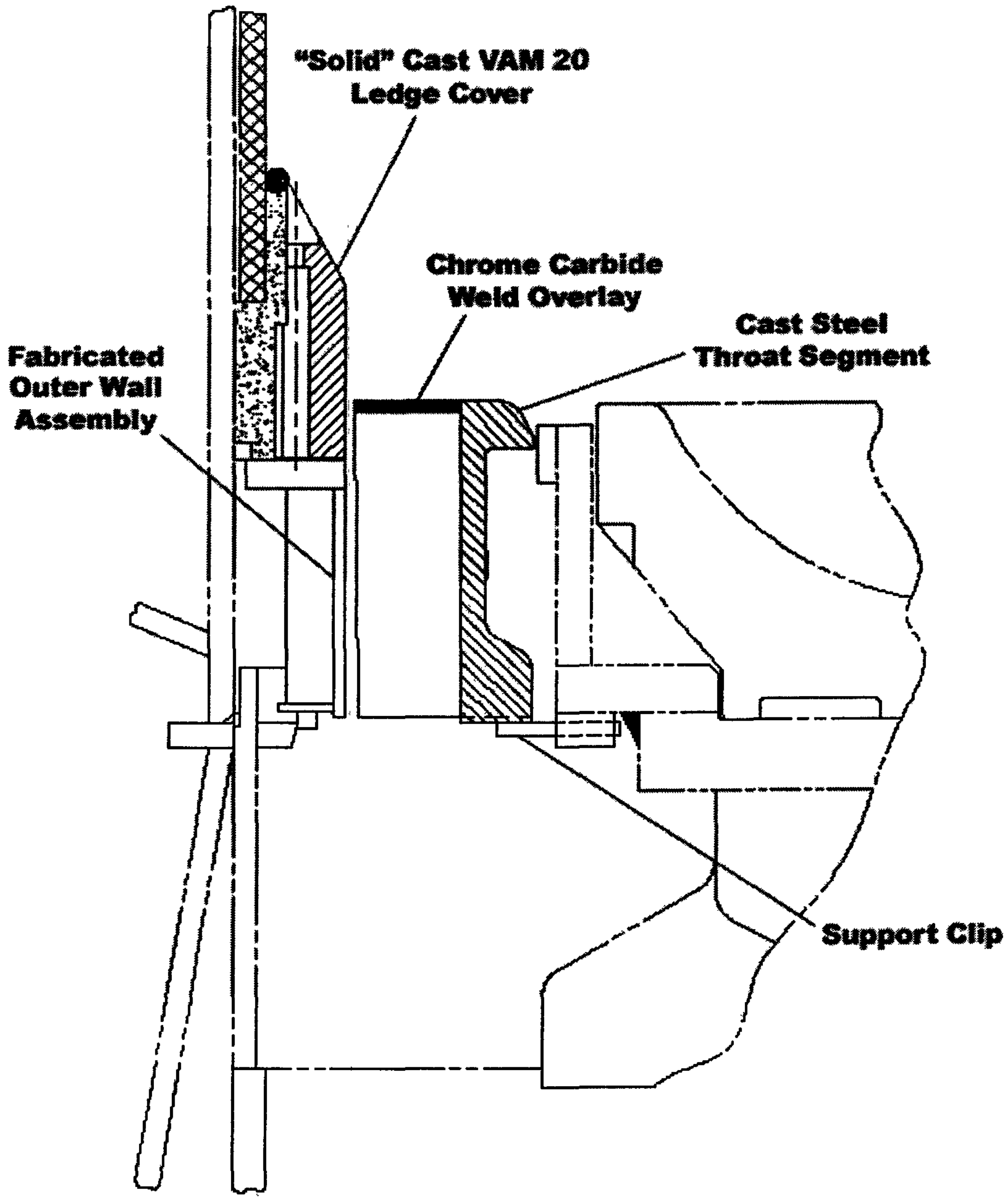
PULVERIZER PERFORMANCE DATA
ROTATING VS. STATIONARY THROAT

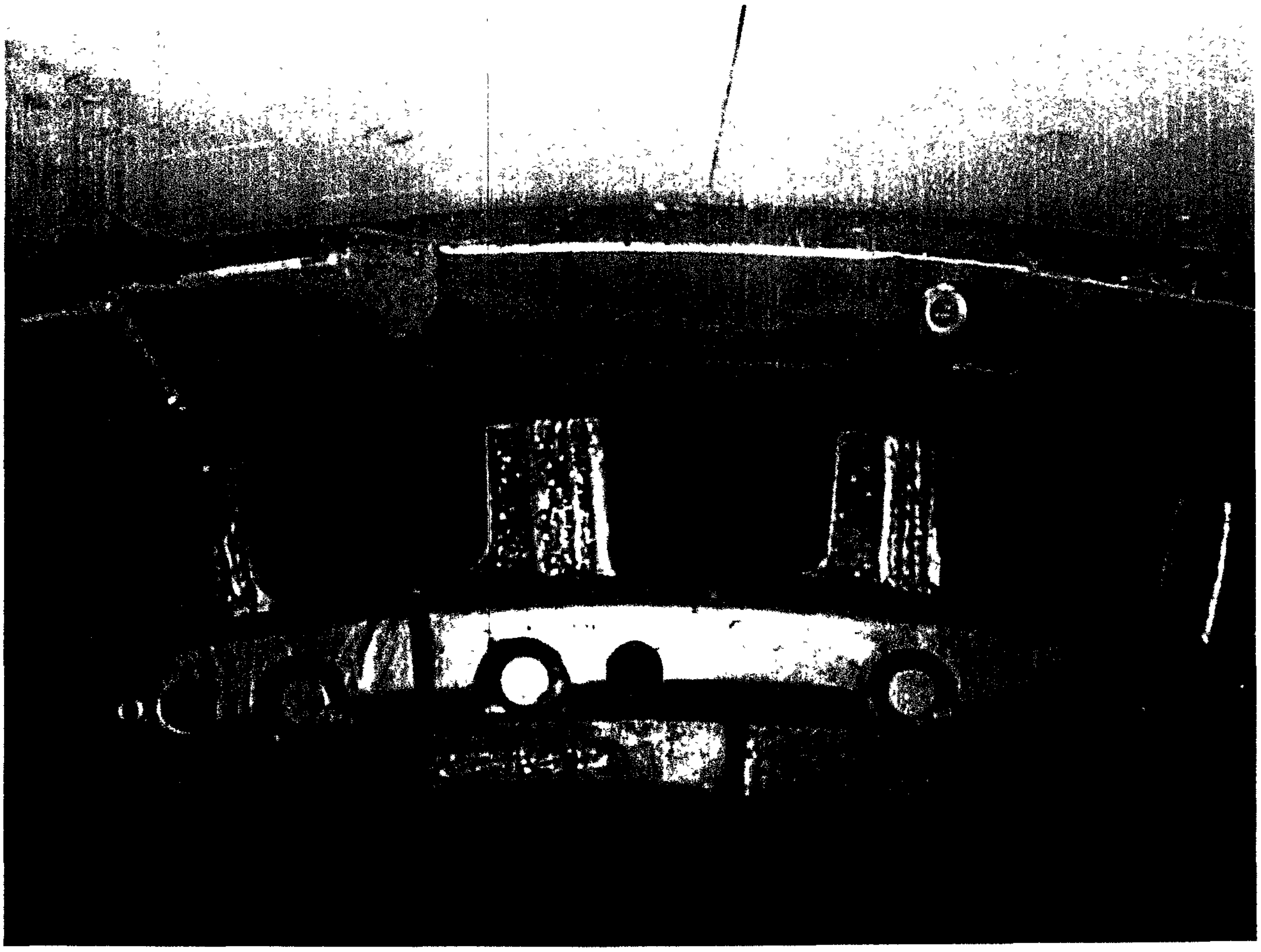
Mill #	3-10	3-10
Test #	1	1
Test Date	2/4/92	8/25/92
THROAT TYPE	B&W STATIONARY	B&W ROTATING*
Coal Flow lb/hr	124850	125000
Air Flow lb/hr	226631	227500
Inlet Air Temp. °F	619	570
Mill Outlet Temp. °F	147	145
Pulverizer Differential In. Wc.	14.3	9.7
Pulverizer Motor Current – Amps	83.4	90.0
% Passing 50 Mesh	99.9	99.9
% Passing 100 Mesh	95.3	94.5
% Passing 200 Mesh	75.8	74.5

* "Low Pressure Drop" Design including CCW Vane Orientation

NOTE: No change in grinding elements or classifier vane settings were made after installation of the rotating throat.

TABLE 1


"Solid" Cast VAM 20
Ledge Cover
Chrome Carbide
Weld Overlay
Cast Steel
Throat Segment
Fabricated
Outer Wall
Assembly
Support Clip



EXISTING OPERATING DATA
B&W ROLL WHEEL TYPE PULVERIZER

The following data (provided by the customer) is required by B&W to size the port area for the rotating throat:

1. Normal full load coal flow per pulverizer ______________________.

2. Normal full load air flow per pulverizer ______________________.

3. Pulverizer inlet/outlet air temperature at above normal full load coal and air flow ______________________.

4. Mill differential pressure at normal full load coal flow ______________________.

5. Mill inlet static pressure at normal full load coal flow (high side of mill differential pressure ______________________.

6. Maximum coal flow at which pulverizer is operated ______________________.

7. Minimum coal flow at which pulverizer is operated ______________________.

8. Number of coal pipes in service per pulverizer ______________________.

9. Raw coal hardgrove grindability ______________________.

10. Raw coal total/surface moisture ______________________.

11. Raw coal ash content ______________________.

12. Rank of fuel ______________________.

13. Is there a significant amount of pyrites, rock or tramp iron in the coal? ______________.

14. Existing Fineness / Desired Fineness ______________________.

15. What is the major goal of installing rotating throats ie; reduce mill pressure drop, reduce grinding zone erosion, improve fineness? ______________________.

EXISTING OPERATING DATA
B&W ROLL WHEEL TYPE PULVERIZER

The following data (provided by the customer) is required by B&W to size the port area for the rotating throat:

1. Normal full load coal flow per pulverizer 50-55 TPH.
2. Normal full load air flow per pulverizer ≈ 3600 lb/min.
3. Pulverizer inlet/outlet air temperature at above normal full load coal and air flow 320-380°F, outlet control to 150°F.
4. Mill differential pressure at normal full load coal flow 14"-19".
5. Mill inlet static pressure at normal full load coal flow (high side of mill differential pressure 43"-46".
6. Maximum coal flow at which pulverizer is operated 68 TPH.
7. Minimum coal flow at which pulverizer is operated 19.5 TPH.
8. Number of coal pipes in service per pulverizer 6 (21" ID).
9. Raw coal hardgrove grindability 40-47.
10. Raw coal total/surface moisture 5-10%, 5-6%.
11. Raw coal ash content 7-12%.
12. Rank of fuel Class 2 Group 4 (Utah Bit).
13. Is there a significant amount of pyrites, rock or tramp iron in the coal? yes.
14. Existing Fineness / Desired Fineness ≈ 70% thru 200 mesh @ 46 HGI, at least match.
15. What is the major goal of installing rotating throats ie; reduce mill pressure drop, reduce grinding zone erosion, improve fineness? life extension throat.

#1 goal - ability to achieve 95% feeder speed without choking the mill (i.e. high ΔP)

#2 - Reduced mill wear and fineness control.

Minutes - Pulverizer Meeting

January 28,2004

Attending:

Phil Hailes	Dale Hurd	Alan Dewsnup
Kelly Cloward	Richard Schmidt	Gary Judkins
Stan Smith	Craig Stumph	

Action Items Assigned:

Phil Hailes:
1) Discuss advantages of Alstom classifiers with Alstom and classifier users.
2) Check with B&W on wear issues regarding the rotating throat.

Alan Dewsnup :
1) Write a requisition for a B&W counter-clock-wise rotating throat.
2) Discuss results of the gearbox evaluations with Aaron Nissen.

Items Discussed:

Outage coordination issues relating to contractor burner work were discussed. TEI will be working on the two (2) bottom rows (B&G) and move up from there, two (2) rows at a time. Tagging issues and boundaries were discussed. There will be approximately 16 people assigned to the Mill Crew during the Outage. They will be working day shift only. Alan Dewsnup reported that I&C would like to take base-line feeder calibrations at the very beginning of the Outage, prior to any mechanical work. They will compare these to feeder calibrations taken after the Outage. It was decided that they can work on these calibrations on the first Saturday (02-28-04) and Sunday (02-29-04). Maintenance will need access to mills and feeders by Monday (03-01-04). Isolation plates were discussed. Alan will make sure there are enough for each mill fabbed prior to the Outage.

A new filtering system upgrade on the Pulverizer gearbox duplex filter was discussed. One option is a duplex filter that will cost approximately $6,000 per mill. Another option is a 6 x 36 filter with a 3-way valve that will cost approximately $2,000 per mill. Either of these options should help with long-term reliability of the gearbox and extend the life of the gearbox bearings. Installing the less expensive filter on a gearbox as a test was discussed. Dale will look at the budget and make a decision regarding the test.

A B&W recommended change that involves installation of a retrofit kit to supply oil to the #4 and #5 bearings on the gearbox was discussed. It is being done on gearboxes when they are rebuilt but probably needs to be completed on gearboxes that will not be rebuilt for sometime. The kit costs $800.

The results of gearbox evaluations were discussed. Unit 1 "G" seems to be in the worst shape. Alan Dewsnup will get with Aaron and discuss change-out options

The status of Alstom classifiers was discussed. Phil will discuss increased through-put and fineness with Steve Shumway from Alstom to help with the justification for the classifiers. He will also try and contact some users to get results of classifier use from them.

B&W rotating throats were discussed. A decision has been made to go with the counter-clock-wise design. Alan Dewsnup will write a requisition to order a throat. Phil will check with B&W about the wear issues between the wall ring and the ledge cover.

Burner coal line restrictor plates were discussed. They have helped with emissions, especially CO levels but they are wearing holes in the coal pipes. Coal quality is also a factor in the coal pipe problems. Installation of restrictors during the Unit 2 Outage was discussed. Some changes have been made to the restrictors during repairs. The plates have been trimmed 2" in a ½ moon shape away from the wall. They have also been coated with hard face material and pad welded to deflect the coal away from the walls. Installing a silicone gasket is another option that was discussed. BPI suggests trimming only 3/4". It was decided that the restrictors will be trimmed 1" and winglets will be installed. Phil ask Kelly to let him know which restrictors have been trimmed 2".

PH:va

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JCP438.doc\klk

January 15, 2004

IP12_002995

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To: Phil Hailes
Subject: Request For Info & Quote Cast Low Pressure Drop Rotating Throat Assembly Intermountain Power RB

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Jeff

Babcock & Wilcox

Rollwheel Pulverizer

Cast "Low Pressure Drop"

Rotating Throat™ Assembly

Information Booklet

By Jeff Pugh
Marketing Specialist, Pulverizer Upgrades
B&W Service Company
Barberton, Ohio
July 2003

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The aerodynamic features of the B&W Rotating Throat™ assembly are very important in minimizing erosive wear of the throat and grinding zone components.

Non uniform air flow in a throat port can result in turbulence and stagnant zones at the port exit. As coal spills over the edge of the ring seat, it can drop down into a low velocity or stagnant area in the port causing erosion of the upper throat and ledge cover.

The B&W Rotating Throat™ incorporates a patented air foil vane design which promotes more uniform air flow within the port, resulting in the virtual elimination of throat segment wear.

I. GENERAL DESIGN FEATURES & BENEFITS (Cont'd)

Providing more uniform air flow at the port exit allows B&W to supply a throat with a larger port area. In fact, with the B&W rotating throat, the minimum port area is located down in the port away from the exit. The larger exit area results in lower velocities leaving the throat port, which reduces erosive wear of the grinding zone components.

The larger port exit area of the B&W rotating throat also promotes increased fineness, since the lower velocity air leaving the throat is not able to carry as large a particle of coal up to the classifier.

It should also be noted that the installation of B&W Cast "Low Pressure Drop" Rotating Throat™ assemblies has resulted in significant reductions in pulverizer pressure drop.

Even though some customers have realized as much as a 10% reduction in mill power consumption after installing B&W Rotating Throat™ assemblies, other customers have not seen any reduction. Therefore, B&W does not make any claim that our rotating throat will reduce mill power.

Rotating throat assemblies are generally installed along with new grinding elements. Pulverizer power consumption is always lower in mills with new grinding elements compared to those having worn-out elements. Some rotating throat suppliers claim that the installation of their rotating throat will reduce pulverizer power consumption. There is little, if any, evidence to support this claim. In most cases, any reduction in pulverizer power consumption that occurs after installing a rotating throat is the result of installing new grinding elements or reduced fineness.

II. VANE ORIENTATION

The B&W Rotating Throat™ assembly is designed to provide performance benefits at least equal to that obtained with stationary throats while dramatically reducing the maintenance costs associated with stationary throat wear.

The original design B&W Rotating Throat™ assemblies included a vane orientation that promoted CW air flow, the same orientation used with all B&W design stationary throats. A B&W rotating throat with this vane orientation will provide fineness comparable to that obtained with the stationary throat and it also will promote the quick removal of rock and other foreign debris from the grinding zone. However, no reduction in pulverizer pressure drop would be expected after installing an original design B&W Rotating Throat™ with the CW vane orientation.

The primary advantage of a CCW vane orientation is the resultant reduction in mill pressure drop. Tests have indicated that an approximate 2" w.c. reduction in pressure drop across the throat results from orienting the vanes in the CCW direction compared to the CW direction. Additional design features, included with the B&W Cast "Low Pressure Drop" Rotating Throat™ assembly, further reduces the resistance to the flow of air through the mill as is evident by performance data included in the Appendix.

Tests performed by B&W have indicated that in some cases a slight reduction in 200 mesh fineness has resulted after installing a rotating throat with a CCW vane orientation. If fineness does decrease, customers have been able to insert classifier blades to increase recirculation in the mill, thereby improving fineness. The increased pressure drop, due to higher recirculating load, has been more than offset by the reduction in pressure drop resulting from the installation of the B&W Rotating Throat™.

The vane orientation used with the B&W Cast "Low Pressure Drop" Rotating Throat™ is CCW.

III. DESCRIPTION

The Cast "Low Pressure Drop" Rotating Throat assembly includes cast carbon steel throat segments. The upper part of each throat segment is welded to the outer perimeter of the ring seat.

The lower area of each throat segment is attached to the ring seat using a single support clip, which acts as a radial strut. This clip is welded to the throat segment and the ring seat.

The wear resistance of the throat segment is increased by applying chromium carbide weld overlay to the upper area of each vane.

A stationary outer wall assembly includes segments fabricated from carbon steel plate that are seal welded to each other and to the pulverizer housing.

Massive ledge cover castings made from VAM® 20 material are bolted to the top of the stationary outer wall assembly.

<u>It should be noted that since none of the throat components attached to the housing extend over the top of the throat segments, no part of the "Low Pressure Drop" rotating throat assembly requires removal prior to raising the ring seat/yoke assembly to facilitate gear box removal.</u>

IV. TEST DATA DISCUSSION

Data has been included in the Appendix comparing the performance of a mill equipped with a B&W Cast "Low Pressure Drop" rotating throat assembly with CCW vane orientation to a mill with a stationary throat.

Table 1 shows data that was taken from a test report where a B&W-89 Cast "Low Pressure Drop" rotating throat, with cast steel throat segments, was compared to that of a stationary throat at the Northern States Power Company – Sherburne County Plant. <u>It is important to note that the grinding elements used during the stationary throat test were reinstalled with the rotating throat</u>.

As can be seen from this data, there was a significant reduction in mill pressure drop after installing the rotating throat. This should allow the static pressure set point in the duct supplying primary air to the mills to be reduced. This is advantageous to this customer since his primary air fans are somewhat marginal. Reducing the supply duct pressure set point will also reduce primary air heater leakage.

V. BENEFITS

- Increased throat wear life
  - Reduces maintenance costs
  - Maintains operation with design air flow
- Reduced Mill Pressure Drop
  - Potential ability to increase fineness by lengthening existing classifier blades or modifying the louver section to the hi-spin design
  - Potential ability to increase mill capacity if load is presently limited by fan static pressure capability
- No need to remove any portion of the rotating throat assembly when replacing a gear drive.
- Potential reduction of primary air flow due to the ability to operate along design air/fuel curve without coal rejects
  - Lower primary air fan power
  - Reduce erosion of grinding zone components, burner pipes and nozzles
  - Increased fineness

NOTE: Operation of the mill with air flow levels below those specified by B&W is not recommended without prior review by B&W. Insufficient primary air flow can result in burner line/nozzle fires and explosions. As air flow is reduced, the inlet air temperature must be increased to maintain mill outlet temperature. This will result in higher primary air chamber metal temperatures, which increases the risk of mill fires.

VI. SCOPE OF SUPPLY

- 14 cast carbon steel throat segments with chrome carbide weld overlay applied to upper area of each vane
- One fabricated carbon steel outer wall assembly
  Note: An outer wall installation fixture is supplied with the initial throat assembly
- One set of cast VAM 20 ledge cover segments
- 14 support clips
- All required attachment fasteners
- Field alteration drawing

APPENDIX

"Low Pressure Drop" Rotating Throat Assembly Illustration

Table 1: Northern States Power – Pulverizer Performance Data

EXCEL ENERGY
SHERBURNE COUNTY UNIT #3
CONTRACT: RB-566

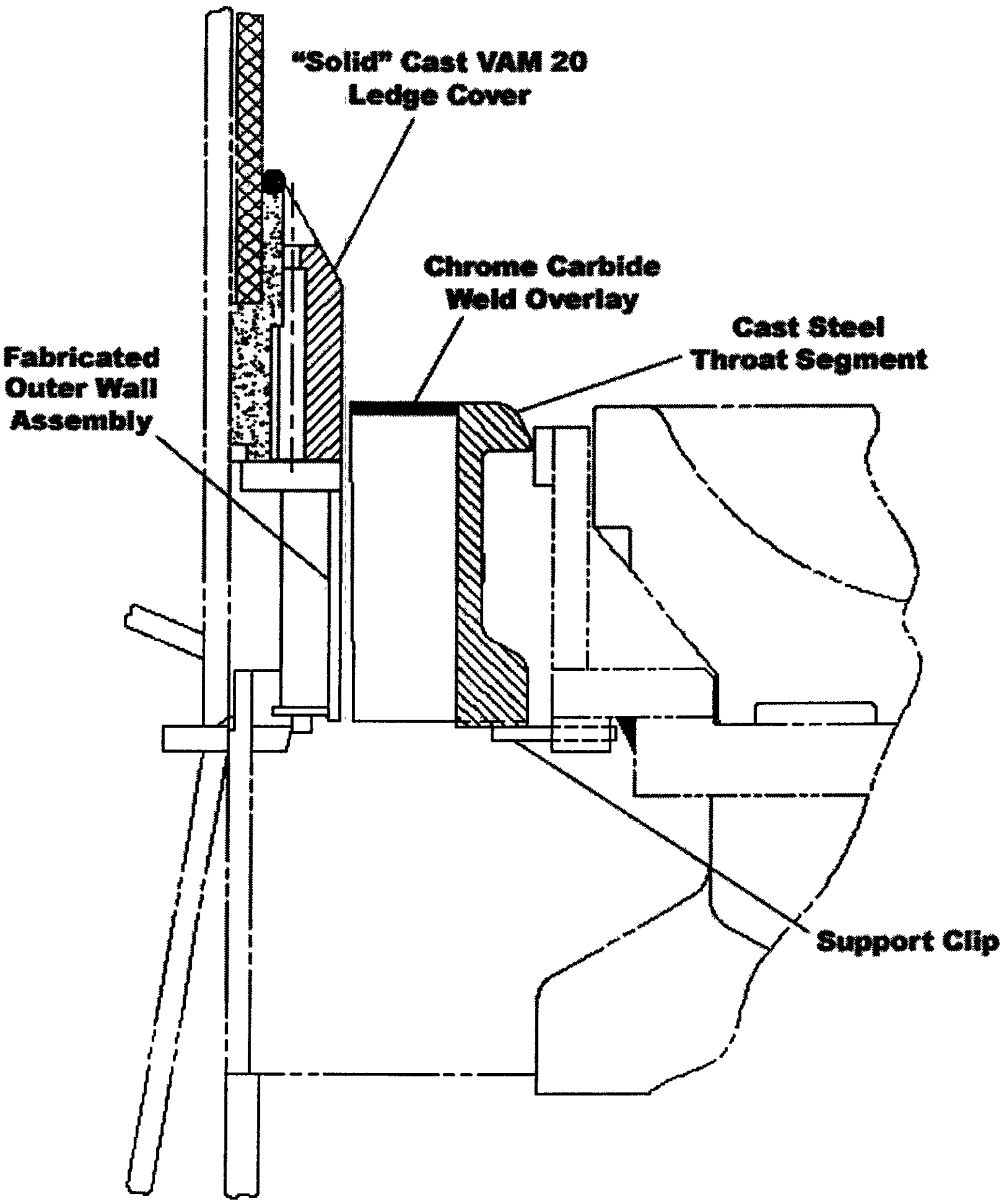
PULVERIZER PERFORMANCE DATA
ROTATING VS. STATIONARY THROAT

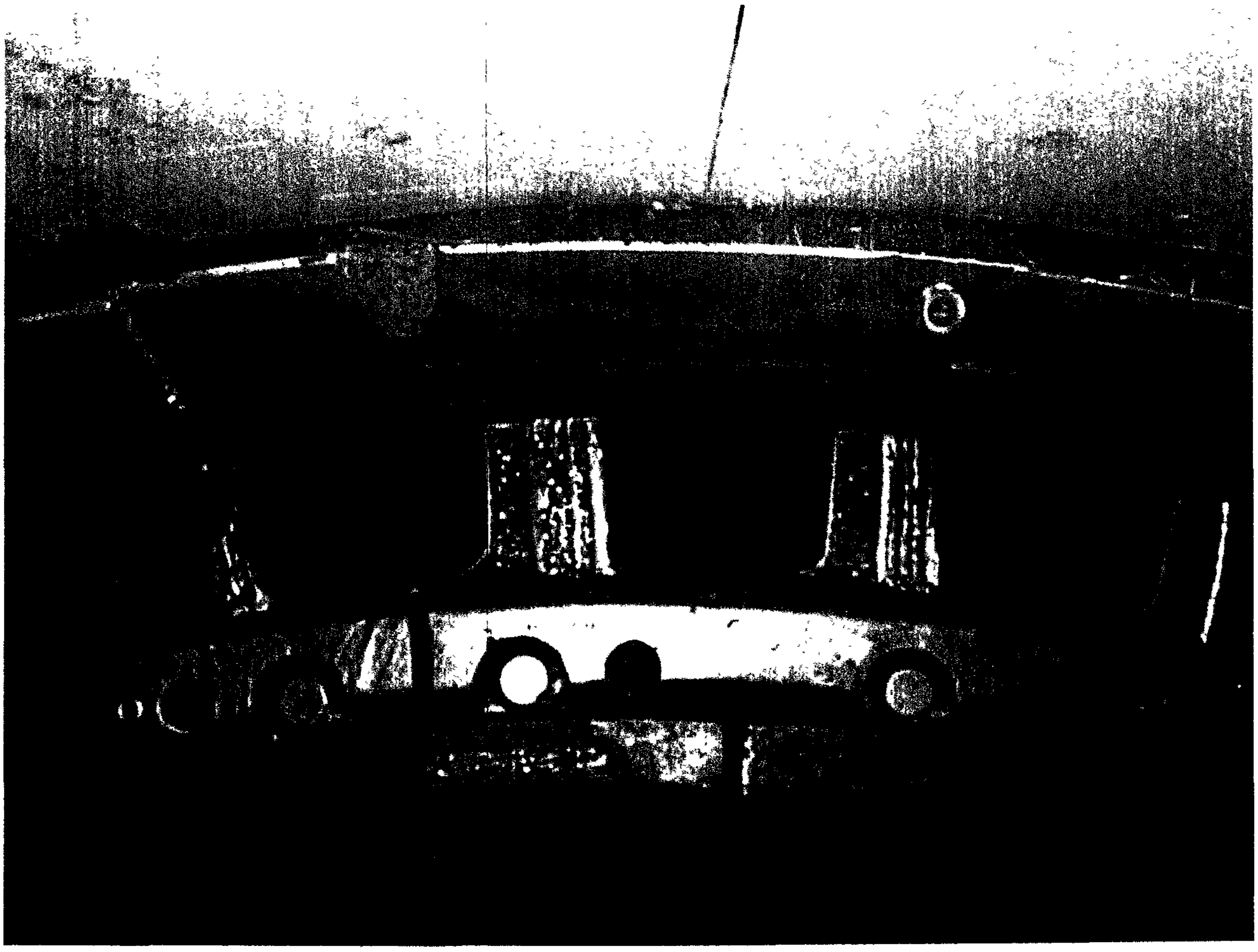
Mill #	3-10	3-10
Test #	1	1
Test Date	2/4/92	8/25/92
THROAT TYPE	B&W STATIONARY	B&W ROTATING*
Coal Flow lb/hr	124850	125000
Air Flow lb/hr	226631	227500
Inlet Air Temp. °F	619	570
Mill Outlet Temp. °F	147	145
Pulverizer Differential In. Wc.	14.3	9.7
Pulverizer Motor Current – Amps	83.4	90.0
% Passing 50 Mesh	99.9	99.9
% Passing 100 Mesh	95.3	94.5
% Passing 200 Mesh	75.8	74.5

* "Low Pressure Drop" Design including CCW Vane Orientation

NOTE: No change in grinding elements or classifier vane settings were made after installation of the rotating throat.

TABLE 1


"Solid" Cast VAM 20
Ledge Cover
Chrome Carbide
Weld Overlay
Cast Steel
Throat Segment
Fabricated
Outer Wall
Assembly
Support Clip



EXISTING OPERATING DATA
B&W ROLL WHEEL TYPE PULVERIZER

The following data (provided by the customer) is required by B&W to size the port area for the rotating throat:

1. Normal full load coal flow per pulverizer ______________________.
2. Normal full load air flow per pulverizer ______________________.
3. Pulverizer inlet/outlet air temperature at above normal full load coal and air flow ______________________.
4. Mill differential pressure at normal full load coal flow ______________________.
5. Mill inlet static pressure at normal full load coal flow (high side of mill differential pressure ______________________.
6. Maximum coal flow at which pulverizer is operated ______________________.
7. Minimum coal flow at which pulverizer is operated ______________________.
8. Number of coal pipes in service per pulverizer ______________________.
9. Raw coal hardgrove grindability ______________________.
10. Raw coal total/surface moisture ______________________.
11. Raw coal ash content ______________________.
12. Rank of fuel ______________________.
13. Is there a significant amount of pyrites, rock or tramp iron in the coal? ______________.
14. Existing Fineness / Desired Fineness ______________________.
15. What is the major goal of installing rotating throats ie; reduce mill pressure drop, reduce grinding zone erosion, improve fineness? ______________________.

From: jcpugh@babcock.com
To: Phil Hailes
Subject: Request For Info & Quote Cast Low Pressure Drop Rotating Throat Assembly Intermountain Power RB

Phil,

Per your request, I have attached a write-up describing B&W's latest design rotating throat assembly which we refer to as our Cast Low Pressure Drop Rotating Throat Assembly.

I have also attached a copy of a document that we refer to as Existing Operating Data B&W Roll Wheel Type Pulverizer. The information that you provide on this sheet will be used by B&W to determine the port area of the throat assembly that we would supply.

I have also attached a copy of a photograph looking down on top of a section of a Cast Low Pressure Drop Rotating Throat Assembly. Please note that the photograph shows early design segments that are bolted to the top surface of the ring seat ledge. Our current standard design throat segments are welded to the outer perimeter of the ring seat ledge.

By copy to Dan Menster, please arrange to have a quotation sent to Phil for one Cast Low Pressure Drop Rotating Throat Assembly.

If you have additional questions, please call me at 330 860-2889, or Dan Menster at 330 860-1946.

Jeff

Babcock & Wilcox

Rollwheel Pulverizer

Cast "Low Pressure Drop"

Rotating Throat™ Assembly

Information Booklet

By Jeff Pugh
Marketing Specialist, Pulverizer Upgrades
B&W Service Company
Barberton, Ohio
July 2003

Table of Contents

IP12_003013

I. GENERAL DESIGN FEATURES & BENEFITS

The B&W Rotating Throat™ is designed to improve mill performance while dramatically reducing the maintenance costs associated with stationary throat wear.

The B&W Rotating Throat™ provides a significant improvement in the air flow distribution around the throat ring compared to the stationary throat.

Tests of mills with stationary throats have shown that the flow of air through some ports is as low as 85% of the average port flow on a clean air basis and 75% while the mill is grinding coal. Such poor distribution generally necessitates having to increase air flow above design levels to prevent coal spillage through the ports in which air flow is lowest.

The B&W Rotating Throat™ is designed with a port area that will allow the mill to be operated at design air flow while maintaining good fineness and without experiencing coal spillage.

Insufficient port area will result in excessive throat velocities which will cause higher pressure drop, lower fineness, and increased grinding zone erosion. Decreasing air flow below the design value, to reduce velocities in a throat having an insufficient port area, can result in burner line/nozzle fires, higher inlet air temperatures, and a mill that is slow to respond to changes in load.

A throat having a port area that is too large will necessitate having to operate the mill with higher than design air flows to prevent excessive coal spillage. Since the rotating throat will be sized to allow operation at design air flow, the potential reduction in air flow will yield lower velocities in the mill as well as in the burner pipes/nozzles. These lower velocities will result in reduced erosion and higher fineness.

The aerodynamic features of the B&W Rotating Throat™ assembly are very important in minimizing erosive wear of the throat and grinding zone components.

Non uniform air flow in a throat port can result in turbulence and stagnant zones at the port exit. As coal spills over the edge of the ring seat, it can drop down into a low velocity or stagnant area in the port causing erosion of the upper throat and ledge cover.

The B&W Rotating Throat™ incorporates a patented air foil vane design which promotes more uniform air flow within the port, resulting in the virtual elimination of throat segment wear.

I. GENERAL DESIGN FEATURES & BENEFITS (Cont'd)

Providing more uniform air flow at the port exit allows B&W to supply a throat with a larger port area. In fact, with the B&W rotating throat, the minimum port area is located down in the port away from the exit. The larger exit area results in lower velocities leaving the throat port, which reduces erosive wear of the grinding zone components.

The larger port exit area of the B&W rotating throat also promotes increased fineness, since the lower velocity air leaving the throat is not able to carry as large a particle of coal up to the classifier.

It should also be noted that the installation of B&W Cast "Low Pressure Drop" Rotating Throat™ assemblies has resulted in significant reductions in pulverizer pressure drop.

Even though some customers have realized as much as a 10% reduction in mill power consumption after installing B&W Rotating Throat™ assemblies, other customers have not seen any reduction. Therefore, B&W does not make any claim that our rotating throat will reduce mill power.

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II. VANE ORIENTATION

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The original design B&W Rotating Throat™ assemblies included a vane orientation that promoted CW air flow, the same orientation used with all B&W design stationary throats. A B&W rotating throat with this vane orientation will provide fineness comparable to that obtained with the stationary throat and it also will promote the quick removal of rock and other foreign debris from the grinding zone. However, no reduction in pulverizer pressure drop would be expected after installing an original design B&W Rotating Throat™ with the CW vane orientation.

The primary advantage of a CCW vane orientation is the resultant reduction in mill pressure drop. Tests have indicated that an approximate 2" w.c. reduction in pressure drop across the throat results from orienting the vanes in the CCW direction compared to the CW direction. Additional design features, included with the B&W Cast "Low Pressure Drop" Rotating Throat™ assembly, further reduces the resistance to the flow of air through the mill as is evident by performance data included in the Appendix.

Tests performed by B&W have indicated that in some cases a slight reduction in 200 mesh fineness has resulted after installing a rotating throat with a CCW vane orientation. If fineness does decrease, customers have been able to insert classifier blades to increase recirculation in the mill, thereby improving fineness. The increased pressure drop, due to higher recirculating load, has been more than offset by the reduction in pressure drop resulting from the installation of the B&W Rotating Throat™.

The vane orientation used with the B&W Cast "Low Pressure Drop" Rotating Throat™ is CCW.

III. DESCRIPTION

The Cast "Low Pressure Drop" Rotating Throat assembly includes cast carbon steel throat segments. The upper part of each throat segment is welded to the outer perimeter of the ring seat.

The lower area of each throat segment is attached to the ring seat using a single support clip, which acts as a radial strut. This clip is welded to the throat segment and the ring seat.

The wear resistance of the throat segment is increased by applying chromium carbide weld overlay to the upper area of each vane.

A stationary outer wall assembly includes segments fabricated from carbon steel plate that are seal welded to each other and to the pulverizer housing.

Massive ledge cover castings made from VAM® 20 material are bolted to the top of the stationary outer wall assembly.

<u>It should be noted that since none of the throat components attached to the housing extend over the top of the throat segments, no part of the "Low Pressure Drop" rotating throat assembly requires removal prior to raising the ring seat/yoke assembly to facilitate gear box removal.</u>

IV. TEST DATA DISCUSSION

Data has been included in the Appendix comparing the performance of a mill equipped with a B&W Cast "Low Pressure Drop" rotating throat assembly with CCW vane orientation to a mill with a stationary throat.

Table 1 shows data that was taken from a test report where a B&W-89 Cast "Low Pressure Drop" rotating throat, with cast steel throat segments, was compared to that of a stationary throat at the Northern States Power Company – Sherburne County Plant. It is important to note that the grinding elements used during the stationary throat test were reinstalled with the rotating throat.

As can be seen from this data, there was a significant reduction in mill pressure drop after installing the rotating throat. This should allow the static pressure set point in the duct supplying primary air to the mills to be reduced. This is advantageous to this customer since his primary air fans are somewhat marginal. Reducing the supply duct pressure set point will also reduce primary air heater leakage.

V. BENEFITS

- Increased throat wear life
  - Reduces maintenance costs
  - Maintains operation with design air flow
- Reduced Mill Pressure Drop
  - Potential ability to increase fineness by lengthening existing classifier blades or modifying the louver section to the hi-spin design
  - Potential ability to increase mill capacity if load is presently limited by fan static pressure capability
- No need to remove any portion of the rotating throat assembly when replacing a gear drive.
- Potential reduction of primary air flow due to the ability to operate along design air/fuel curve without coal rejects
  - Lower primary air fan power
  - Reduce erosion of grinding zone components, burner pipes and nozzles
  - Increased fineness

NOTE: Operation of the mill with air flow levels below those specified by B&W is not recommended without prior review by B&W. Insufficient primary air flow can result in burner line/nozzle fires and explosions. As air flow is reduced, the inlet air temperature must be increased to maintain mill outlet temperature. This will result in higher primary air chamber metal temperatures, which increases the risk of mill fires.

VI. SCOPE OF SUPPLY

- 14 cast carbon steel throat segments with chrome carbide weld overlay applied to upper area of each vane
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  Note: An outer wall installation fixture is supplied with the initial throat assembly
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APPENDIX

"Low Pressure Drop" Rotating Throat Assembly Illustration

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SHERBURNE COUNTY UNIT #3
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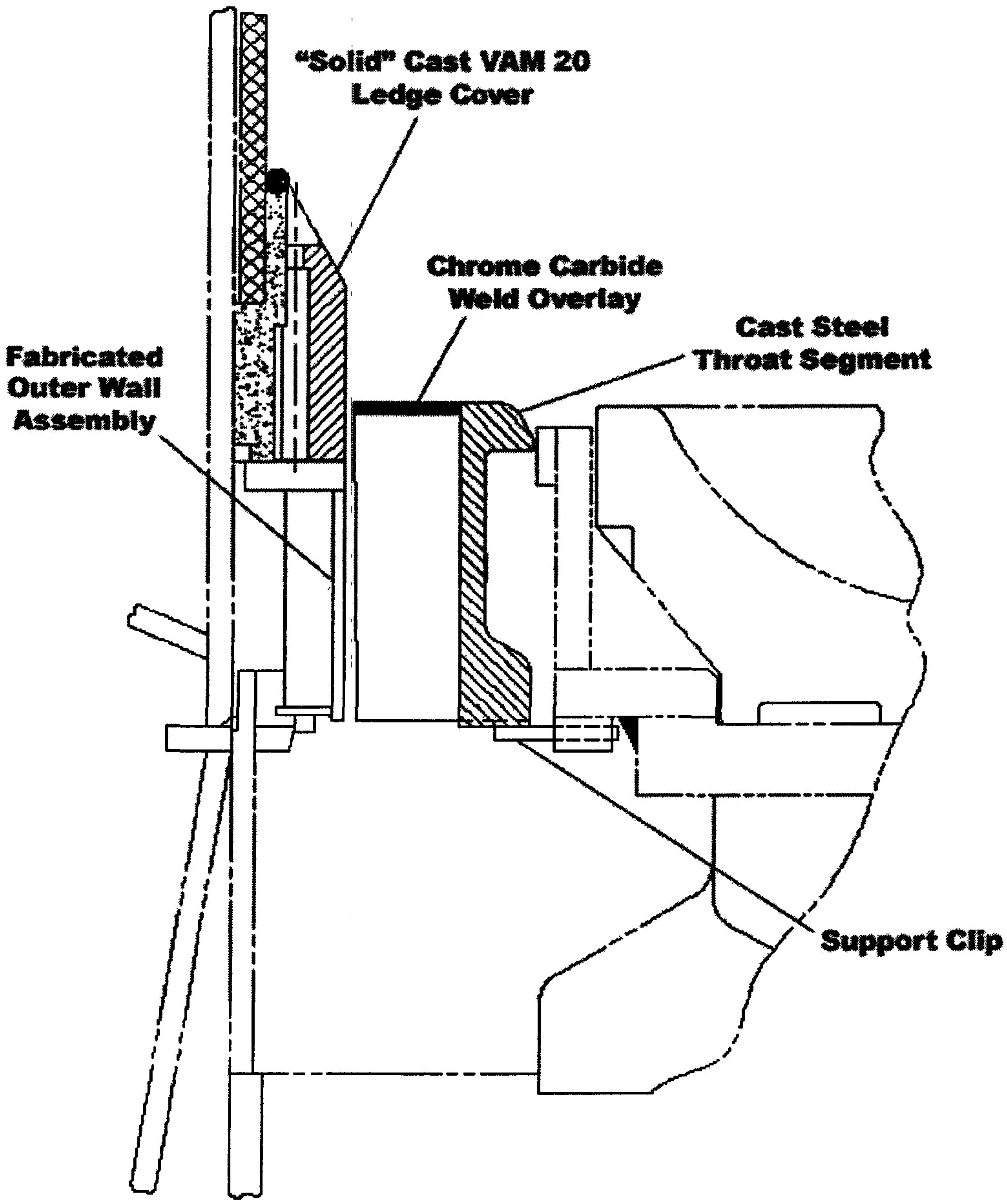
PULVERIZER PERFORMANCE DATA
ROTATING VS. STATIONARY THROAT

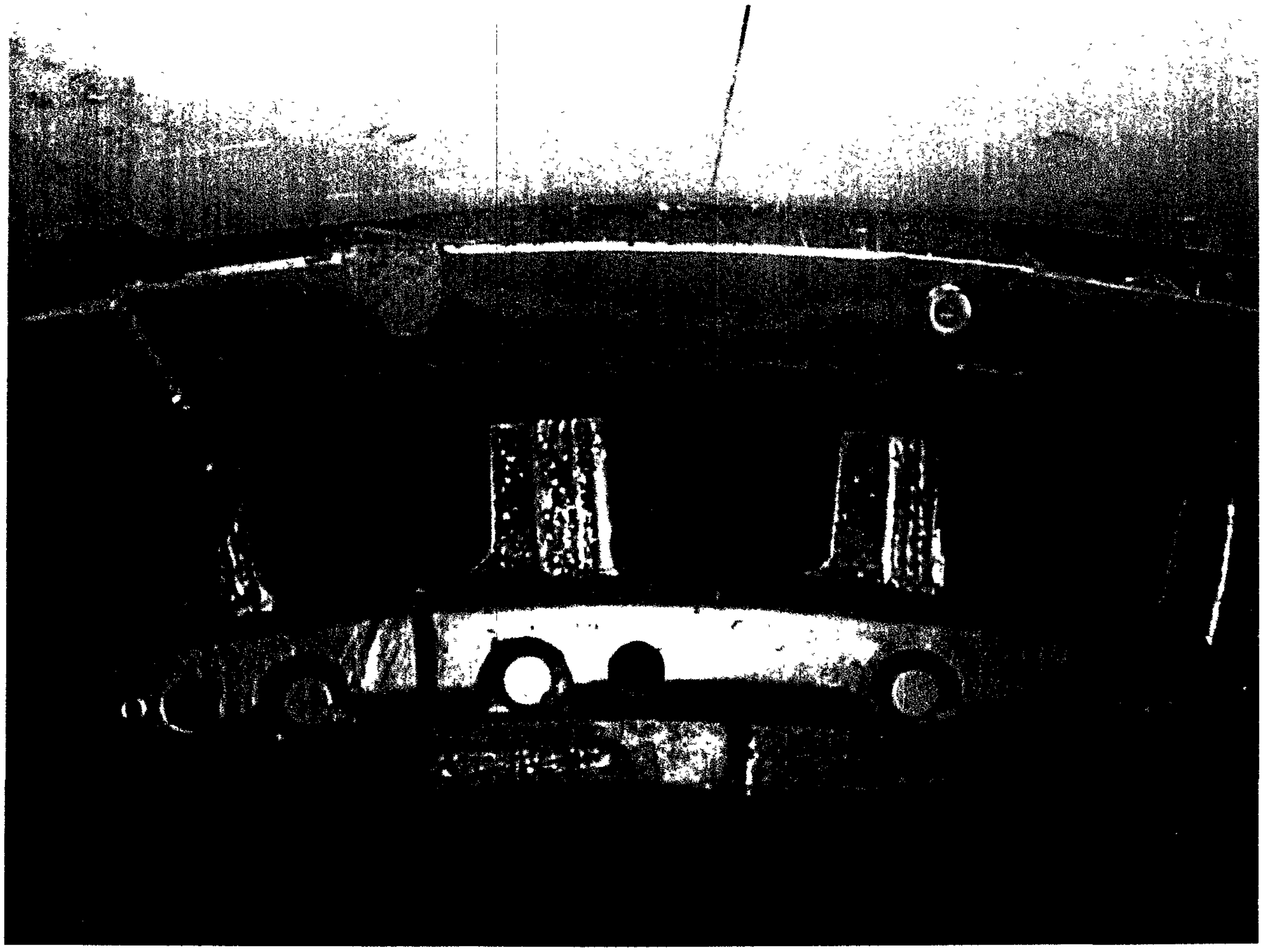
Mill #	3-10	3-10
Test #	1	1
Test Date	2/4/92	8/25/92
THROAT TYPE	B&W STATIONARY	B&W ROTATING*
Coal Flow lb/hr	124850	125000
Air Flow lb/hr	226631	227500
Inlet Air Temp. °F	619	570
Mill Outlet Temp. °F	147	145
Pulverizer Differential In. Wc.	14.3	9.7
Pulverizer Motor Current – Amps	83.4	90.0
% Passing 50 Mesh	99.9	99.9
% Passing 100 Mesh	95.3	94.5
% Passing 200 Mesh	75.8	74.5

* "Low Pressure Drop" Design including CCW Vane Orientation

NOTE: No change in grinding elements or classifier vane settings were made after installation of the rotating throat.

TABLE 1


"Solid" Cast VAM 20
Ledge Cover
Chrome Carbide
Weld Overlay
Cast Steel
Throat Segment
Fabricated
Outer Wall
Assembly
Support Clip



EXISTING OPERATING DATA
B&W ROLL WHEEL TYPE PULVERIZER

The following data (provided by the customer) is required by B&W to size the port area for the rotating throat:

1. Normal full load coal flow per pulverizer ______________________.

2. Normal full load air flow per pulverizer ______________________.

3. Pulverizer inlet/outlet air temperature at above normal full load coal and air flow ______________________.

4. Mill differential pressure at normal full load coal flow ______________________.

5. Mill inlet static pressure at normal full load coal flow (high side of mill differential pressure ______________________.

6. Maximum coal flow at which pulverizer is operated ______________________.

7. Minimum coal flow at which pulverizer is operated ______________________.

8. Number of coal pipes in service per pulverizer ______________________.

9. Raw coal hardgrove grindability ______________________.

10. Raw coal total/surface moisture ______________________.

11. Raw coal ash content ______________________.

12. Rank of fuel ______________________.

13. Is there a significant amount of pyrites, rock or tramp iron in the coal? ______________.

14. Existing Fineness / Desired Fineness ______________________.

15. What is the major goal of installing rotating throats ie; reduce mill pressure drop, reduce grinding zone erosion, improve fineness? ______________________.

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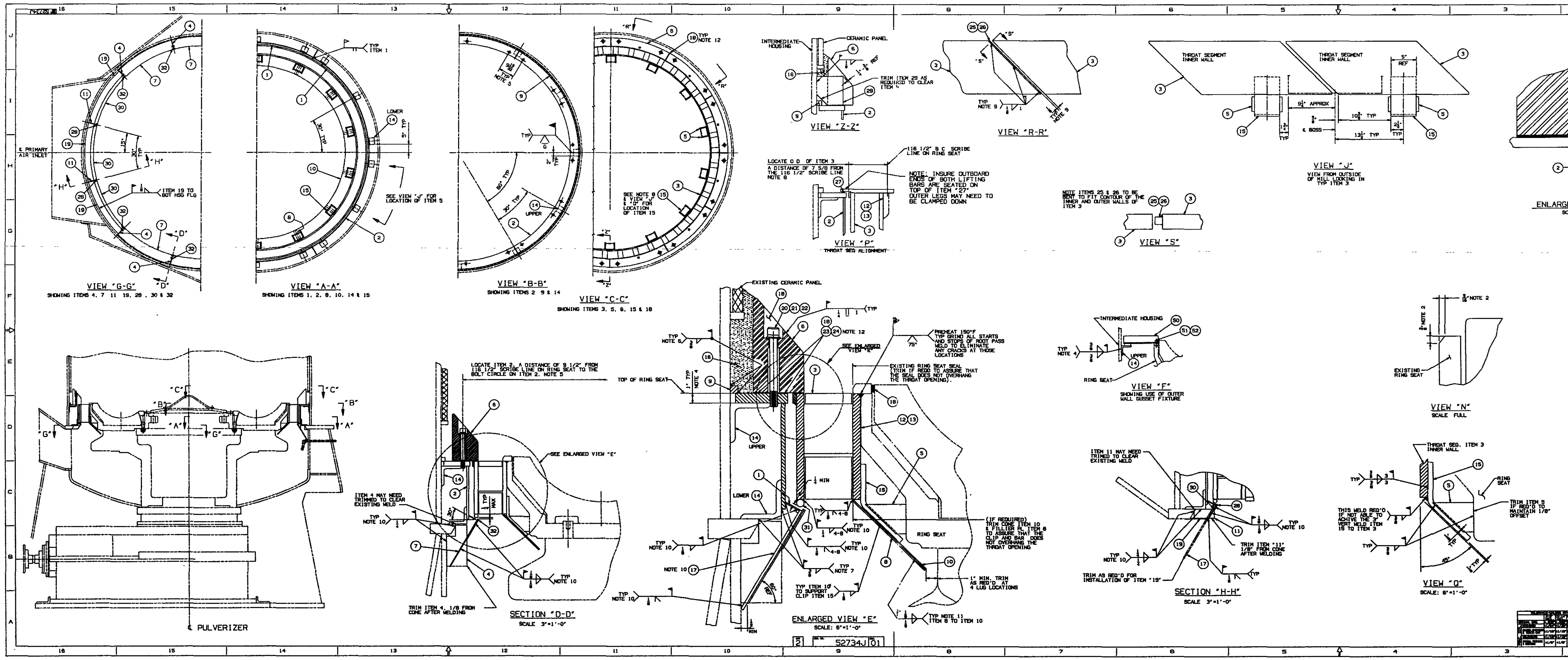
15. What is the major goal of installing rotating throats ie; reduce mill pressure drop, reduce grinding zone erosion, improve fineness? ______________________________.

JCP438.doc\klk

January 15, 2004

Kent Keele 435-748-6520



NOTE

1 SEE DRAWING S22922E FOR FIELD INSTALLATION NOTES.

PART NO. A040595

QUANTITY SHOWN FOR ONE (1) PER JOB SITE

ITEM	QTY	DESCRIPTION	DWG. NO	PART NO
52	1	WASHER TYPE B NARROW 5/8		3045536
51	1	5/8 11UNC-2A SOC HD CAP SCR X 1 1/2 LG.		3021647
50	1	OUTER WALL GUSSET FIXTURE	3490790C	4652921

PARTS LIST

FIELD REQ'D ITEMS FOR INSTALLATION

PART NO. A042201

QUANTITY SHOWN FOR ONE (1) PULVERIZER

ITEM	QTY	DESCRIPTION	DWG. NO.	PART NO.
32	10	PL STL 1 1/2 X 1/8 X 4 1/2 LG		4656650
31	14	BAR RD STL 3/4 DIA X 29" LG (ROLL TO 65 1/8 MEAN RADIUS)		4657671
30	3	OUTER CONE (ABOVE AIR INLET)	1350067C	4655736
29	12	PL STL 5 5/8 X 3/16 X 5 7/8 LG.		2161172
28	2	PL STL 1 1/2 X 1/8 X 1 1/16 LG.		4656649
27	28	BAR 1/4 X 1/4 X 3 LG		4630615
26	28	FILLER BAR 1/4 X 1/4 X 14 3/4 LG.		4655757
25	28	FILLER BAR 3/8 X 3/8 X 14 3/4 LG.		4655758
24	40	SHIM 3 X 3 X 13/16 SLOT .050 THK McMASTERS		4665146
23	40	SHIM 3 X 3 X 13/16 SLOT .025 THK McMASTERS		4665145
22	24	WASHER 3/4" TYPE "B" NARROW FLAT		4652953
21	24	SOC. HD. CAP SCR. 3/4-10UNC-2A X 7 1/4 LG.		4652954
20	24	LOCKWASHER 3/4 HI-COLLAR		0493464
19	3	SEAL RING(OUTER CONE AT AIR INLET)	2997948	4658255
18	16	HIGH TEMP RTV 106 "RED" SEALANT GENERAL ELECTRIC OR EQUAL (12 FL. OZ CARTRIDGE)		6029968
17	36	OUTER CONE BRACE	2995218	4657123
16	[illegible]	KAOCRETE B		0512003
15	14	SUPPORT CLIP	3011848	[illegible]
14	30	ANGLE 4" X 4" X 1/2 X 4" LG		[illegible]
13	42	SHIM 1/2 X 1/16 X 4" LG		[illegible]
12	42	SHIM 1/2 X 1/32 X 4" LG		[illegible]
11	2	PL STL 2 x 1/4 x 5" LG		[illegible]
10	14	DETAIL LOWER CONE	3468974C	[illegible]
9	6	BAR STL 1 x 1 x 75 LG (ROLL TO 71 1/2" MEAN R.)		[illegible]
8	14	PL STL 1 1/2 x 1/8 x 10" LG		[illegible]
7	9	DETAIL OUTERWALL CONE	[illegible]	[illegible]
6	12	DETAIL LEDGE COVER (VAM 20)	[illegible]	[illegible]
5	28	DETAIL SUPPORT CLIP GUSSET	[illegible]	[illegible]
4	10	DETAIL OUTER CONE SUPPORT	[illegible]	[illegible]
3	14	ASSEMBLY THROAT SEGMENT (VAM 20)	[illegible]	4657491
2	6	ASSEMBLY OUTER WALL	[illegible]	[illegible]
1	12	OUTER CONE BAFFLE	[illegible]	[illegible]

PARTS LIST

W.C.KISH	BABCOCK & WILCOX A McDermott Company
D DOWDELL	
S.J.WILLIAMS	
01/04/[illegible]	FIELD ALTERATION WELDED ROTATING THROAT W/REPLACEABLE VANES MPS-89G PULVERIZER
STANDARD	
SCALE 1 1/2"=1'-0"	52734J 01

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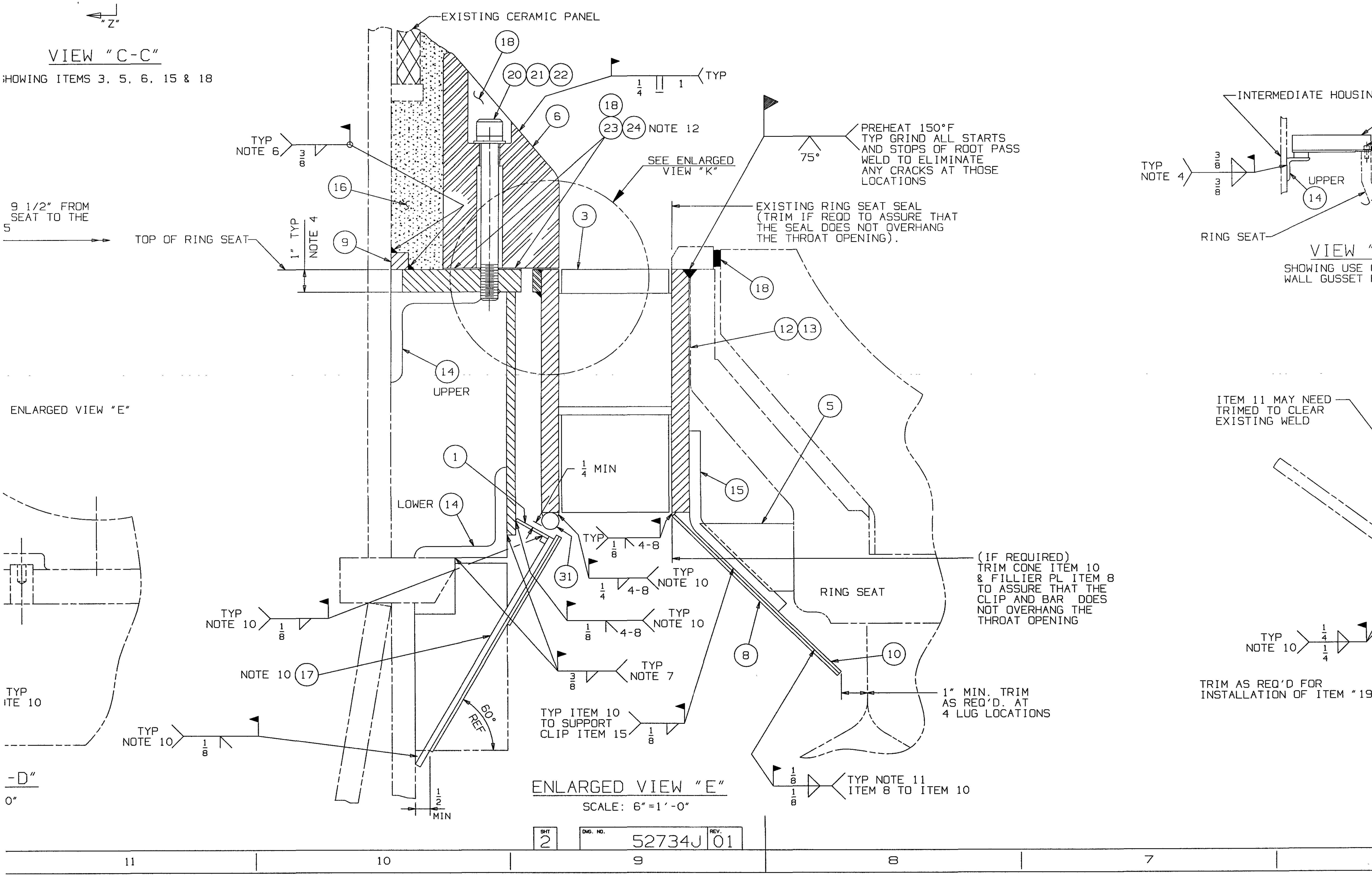
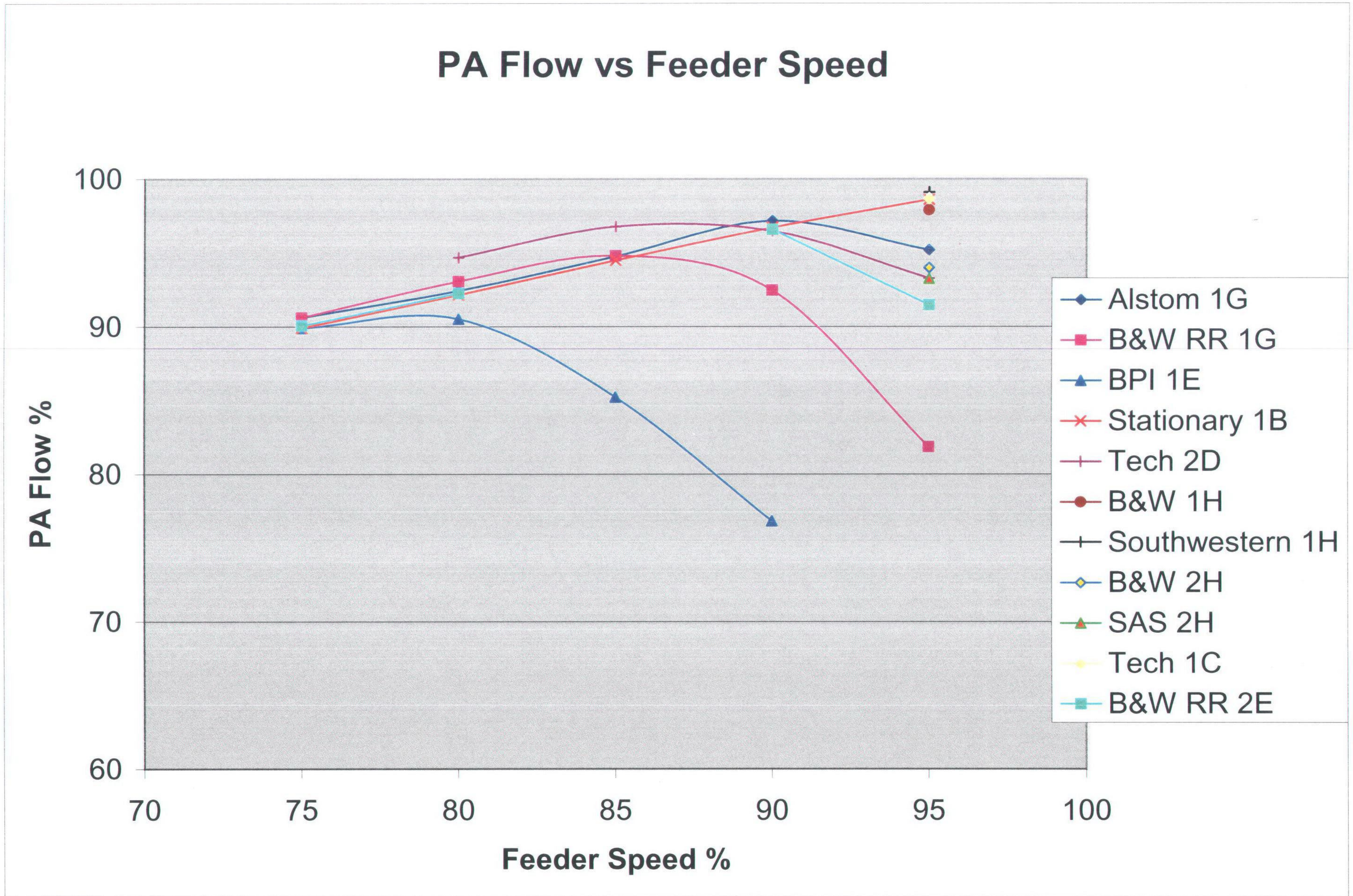
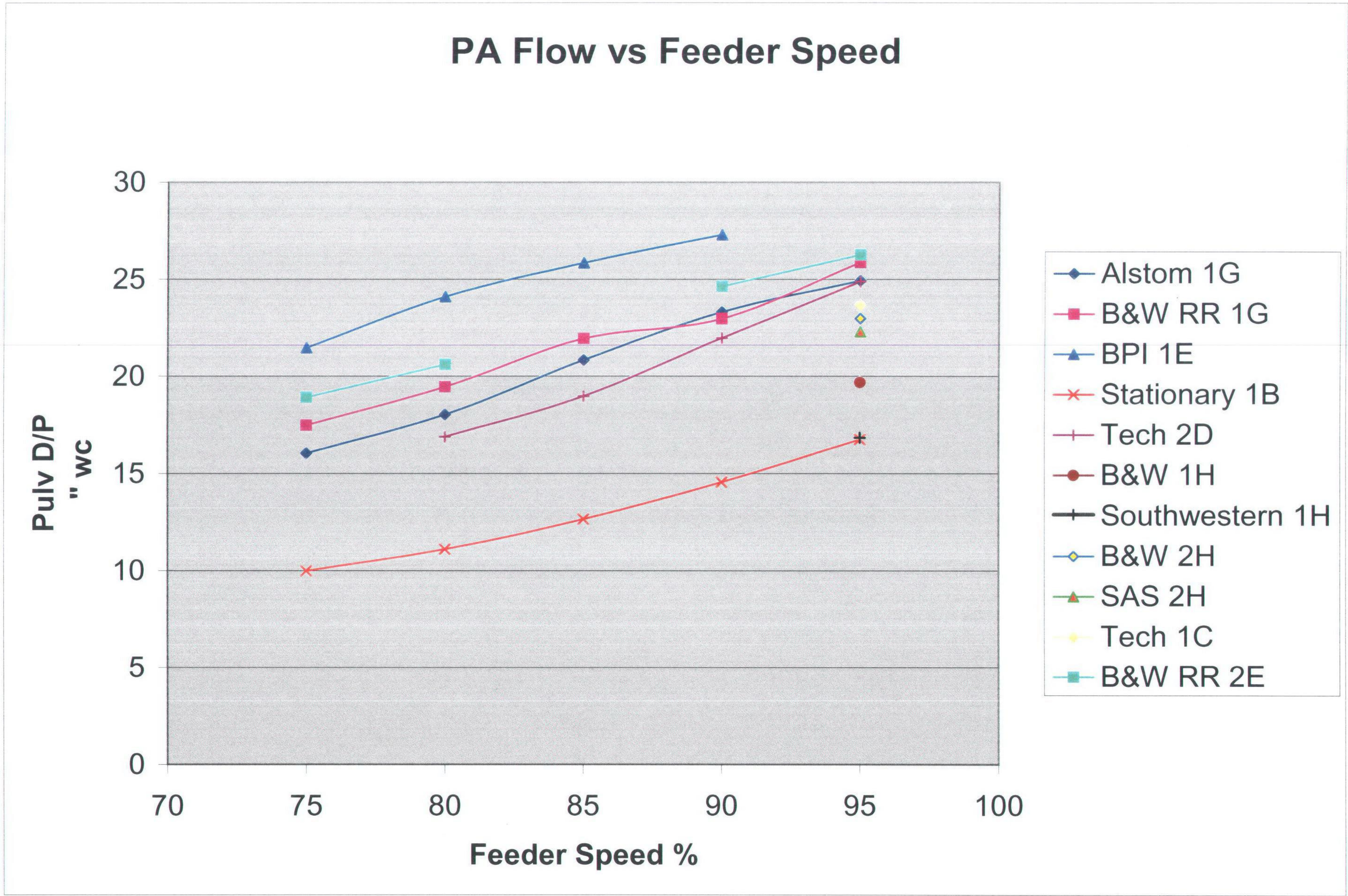
2/3/2004, 09:55:27 AM, c:\temp\dis\52734j.906,



"Z"
VIEW "C-C"
SHOWING ITEMS 3, 5, 6, 15 & 18
EXISTING CERAMIC PANEL
18
20 21 22
1/4 1 TYP
6
18
23 24 NOTE 12
TYP NOTE 6
3/8
16
SEE ENLARGED VIEW "K"
PREHEAT 150°F
TYP GRIND ALL STARTS AND STOPS OF ROOT PASS WELD TO ELIMINATE ANY CRACKS AT THOSE LOCATIONS
75°
9 1/2" FROM SEAT TO THE
5
TOP OF RING SEAT
1" TYP NOTE 4
9
3
EXISTING RING SEAT SEAL (TRIM IF REQD TO ASSURE THAT THE SEAL DOES NOT OVERHANG THE THROAT OPENING).
18
12 13
14 UPPER
ENLARGED VIEW "E"
5
1
1/4 MIN
15
LOWER 14
TYP 1/8 4-8
31
1/4 4-8 TYP NOTE 10
(IF REQUIRED) TRIM CONE ITEM 10 & FILLIER PL ITEM 8 TO ASSURE THAT THE CLIP AND BAR DOES NOT OVERHANG THE THROAT OPENING
RING SEAT
TYP NOTE 10 1/8
1/8 4-8 TYP NOTE 10
NOTE 10 17
3/8 TYP NOTE 7
8
10
TYP NOTE 10
TYP NOTE 10 1/8
60° REF
TYP ITEM 10 TO SUPPORT CLIP ITEM 15 1/8
1" MIN. TRIM AS REQ'D. AT 4 LUG LOCATIONS
1/8 1/8 TYP NOTE 11 ITEM 8 TO ITEM 10
-D"
0"
1/2 MIN
ENLARGED VIEW "E"
SCALE: 6"=1'-0"
INTERMEDIATE HOUSIN
TYP NOTE 4 3/8 3/8
UPPER
14
RING SEAT
VIEW "
SHOWING USE C WALL GUSSET F
ITEM 11 MAY NEED TRIMED TO CLEAR EXISTING WELD
TYP NOTE 10 1/4 1/4
TRIM AS REQ'D FOR INSTALLATION OF ITEM "19"
SHT 2
DWG. NO. 52734J
REV. 01
11 10 9 8 7
IP12_003028
2/3/2004, 09:55:55 AM, c:\temp\dis\52734j.906,


PA Flow vs Feeder Speed
PA Flow %
100
90
80
70
60
70
75
80
85
90
95
100
Feeder Speed %
Alstom 1G
B&W RR 1G
BPI 1E
Stationary 1B
Tech 2D
B&W 1H
Southwestern 1H
B&W 2H
SAS 2H
Tech 1C
B&W RR 2E



8/30/2004

C:\GC\PULV\B&W vs Alstom PA chart.xls

Printed out for: PHIL-H - 07-Oct-04 10:29:31
0 Messages U1 Pulv 2 Unit 1 Pulv data 07-Oct-04 10:29:31

Unit 1 939.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Burner Location	3rd row Front	1st row Front	2nd row Rear	4th row Rear	4th row Front	2nd row Front	1st row Rear	3rd row Rear
Motors						TECO	TECO	
Pulv Status	ON	ON	OFF	ON	ON	ON	ON	ON
Feeder Speed	77.3	76.8	0.0	79.2	79.5	77.4	78.8	81.9
Amps	59.7	68.0	0.0	69.5	68.7	58.7	47.5	66.7
Stator Temp (C)	87.3	99.7	33.7	112.	123.	81.3	61.9	132.
Mtr Brg Temp-IB	152.	146.	77.9	142.	164.	149.	142.	131.
Mtr Brg Temp-OB	123.	136.	75.6	121.	153.	134.	126.	141.
Rotating Throat			Tech		BPI		B&W RR	B&W
Backplate Ave T	954.	848.	974.	906.	952.	897.	890.	916.
SA Damper Pos	73.1	73.2	35.8	73.3	73.4	77.1	72.8	74.0
SA Windbox Press	2.5	2.1	0.2	2.3	2.2	2.6	0.0	1.4
Coal Pipe Ave T	633.	617.	607.	626.	637.	633.	614.	613.
Previous Rotating							Alstom	SW

EndTim= 07-Oct-04 10:29:31 /EvalTim= 07-Oct-04 10:29:31 /PanRate= 0

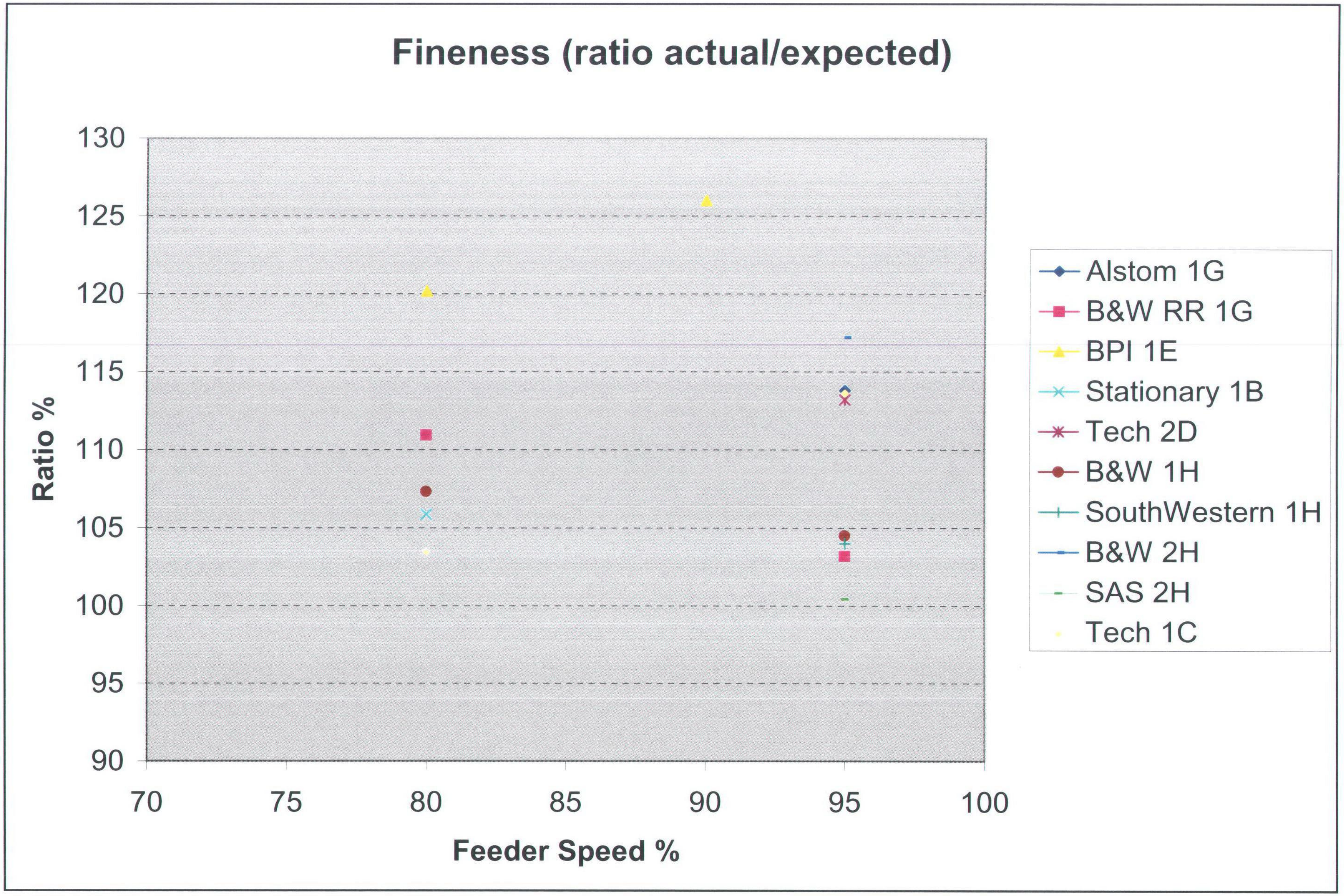
Printed out for: PHIL-H - 07-Oct-04 10:29:43

0 Messages U2 PULV 2 Unit 2 Pulv Data 07-Oct-04 10:29:43

Unit 2 940.0 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Burner Location	3rd row Front	1st row Front	2nd row Rear	4th row Rear	4th row Front	2nd row Front	1st row Rear	3rd row Rear
Pulv Status	OFF	ON	ON	ON	ON	ON	ON	ON
Feeder Speed	0.2	77.8	80.7	77.3	77.1	73.7	73.4	71.2
Amps	0.0	60.1	62.6	68.1	59.2	62.9	62.6	69.8
Stator Temp (C)	55.4	99.0	101.	124.	85.9	116.	98.8	106.
Mtr Brg Temp-IB	97.7	144.	158.	160.	143.	161.	167.	167.
Mtr Brg Temp-OB	93.3	124.	136.	146.	132.	129.	135.	147.
Rotating Throat		B&W RR		Tech	B&W RR			B&W
Backplate Ave T	147.	435.	21.	0.	25.	354.	59.	0.
SA Damper Pos	25.0	72.9	77.3	76.9	77.4	72.0	67.8	66.3
SA Windbox Press	0.0	2.1	2.9	2.7	2.8	2.8	2.0	2.7
Coal Pipe Ave T	0.	713.	41.	173.	37.	699.	44.	0.
Previous Rotating								SAS

EndTim= 07-Oct-04 10:29:43 /EvalTim= 07-Oct-04 10:29:43 /PanRate= 0

IP12_003032



Aug 30, 04

IP12_003033

Intermountain Generating Station
Pulverizer Fineness Results

Test#	Stationary	Stationary	Tech	Stationary	BPI	Stationary	B&W RR	B&W
Date Tested	7/7/2003	7/7/2003	7/9/2003	7/9/2003	7/2/2003	7/7/2003	8/19/2004	7/8/2003
Unit	1	1	1	1	1	1	1	1
Mill	A	B	C	D	E	F	G	H
% Feeder Speed	80	80	80	80	80	80	80	80
Actual % Through 200 Mesh	73.90	68.20	70.60	68.80	75.40	74.00	67.98	68.90
Expected % Through 200 Mesh	62.26	64.41	68.22	67.12	62.74	62.67	61.27	64.19
HGI	44.0	45.7	48.1	47.4	44.8	44.0	43.3	45.1
Total Moisture	7.79	8.66	8.16	8.44	9.15	7.36	8.38	7.83
Air Dry Loss	6.46	7.30	6.89	7.07	7.59	5.92	6.18	6.32
As Received Btu	11,867	11,782	11,932	11,969	11,519	12,118	11,600	11,980

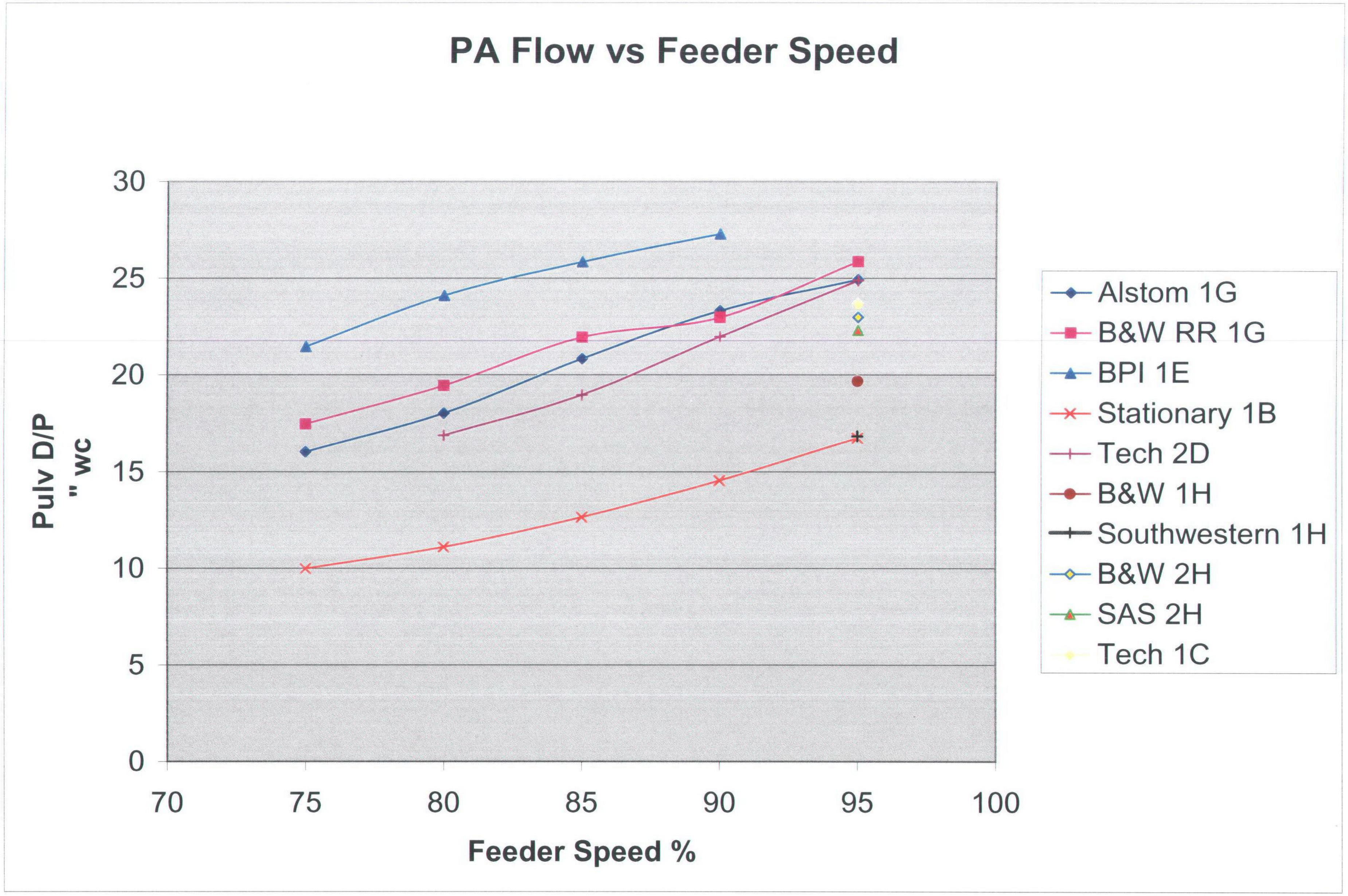
Test Period Average Data								
Test								
Unit Pulv	1/A	1/B	1/C	1/D	1/E	1/F	1/G	1/H
% Feeder Speed	79.71	83.08	81.37	81.74	80.32	80.51	79.89	82.53
Actual Pulv Coal Flow (tph)	54.17	53.60	55.33	55.56	54.62	54.73	54.35	56.12
PA Damper Position (%)	75.51	82.06	98.98	77.43	87.74	75.59	81.25	83.65
PA Flow (%)	92.14	92.16	92.42	94.29	91.38	91.63	92.45	91.32
PA Inlet Damper Temp (DEGF)	300.77	322.53	325.48	310.52	316.49	322.19	328.74	351.64
PA D/P (INWC)	16.94	18.12	25.16	19.80	20.30	17.77	18.64	21.53
Disch Temp (DEGF)	150.00	151.07	150.92	150.03	150.94	151.02	150.53	149.74
Pulv Motor (amps)	68.48	58.57	67.91	61.27	79.34	64.04	46.82	61.57
PA Mass Flowrate (lb/min)	3709	3639	3624	3663	3617	3596	3653	3653
air to fuel ratio	2.02	1.93	1.98	2.01	1.98	1.99	2.02	1.94
Pulv hrs since 30K Overhaul	12395	15858	6315	2481	1884	13380	585	834
Pulv H amp swing	9.24	6.16	7.96	6.78	10.63	8.71	3.76	5.84
PA Duct Pressure (INWC)	47.82	48.27	46.30	46.22	43.70	48.24	46.21	47.30
Hydraulic Skid Press FeedBack	2297	2219	392	2209	2159	2383	2102	2329
Hydraulic Skid Press Set Pt	2388	2400	2399	2400	2388	2398	2393	2400

Test								
Mill	A	B	C	D	E	F	G	H
* Contract % Through 200 Mesh **@ 95 % FDR SPEED**	70	70	70	70	70	70	70	70
HGI Correction	0.880	0.914	0.962	0.948	0.896	0.880	0.866	0.902
Moisture Correction	0.975	0.967	0.971	0.969	0.964	0.981	0.978	0.977
Fineness Correction	1.118	1.086	1.028	1.045	1.111	1.112	1.133	1.090
Expected % Through 200 Mesh (Good @ 65 tph only)	62.26	64.41	68.22	67.12	62.74	62.67	61.27	64.19
Actual % Through 200 Mesh	73.90	68.20	70.60	68.80	75.40	74.00	67.98	68.90
Difference	11.64	3.79	2.38	1.68	12.66	11.33	6.71	4.71
Ratio	118.69	105.88	103.49	102.50	120.18	118.07	110.96	107.35
% Retained on 30 & 50 Mesh	0.20	0.30	0.30	0.10	0.00	0.20	0.21	0.10
Actual % Through 50 Mesh	99.60	99.50	99.30	99.00	99.70	99.50	99.79	98.90
Actual % Through 100 Mesh	96.70	94.60	95.90	95.70	97.20	96.80	95.78	95.70

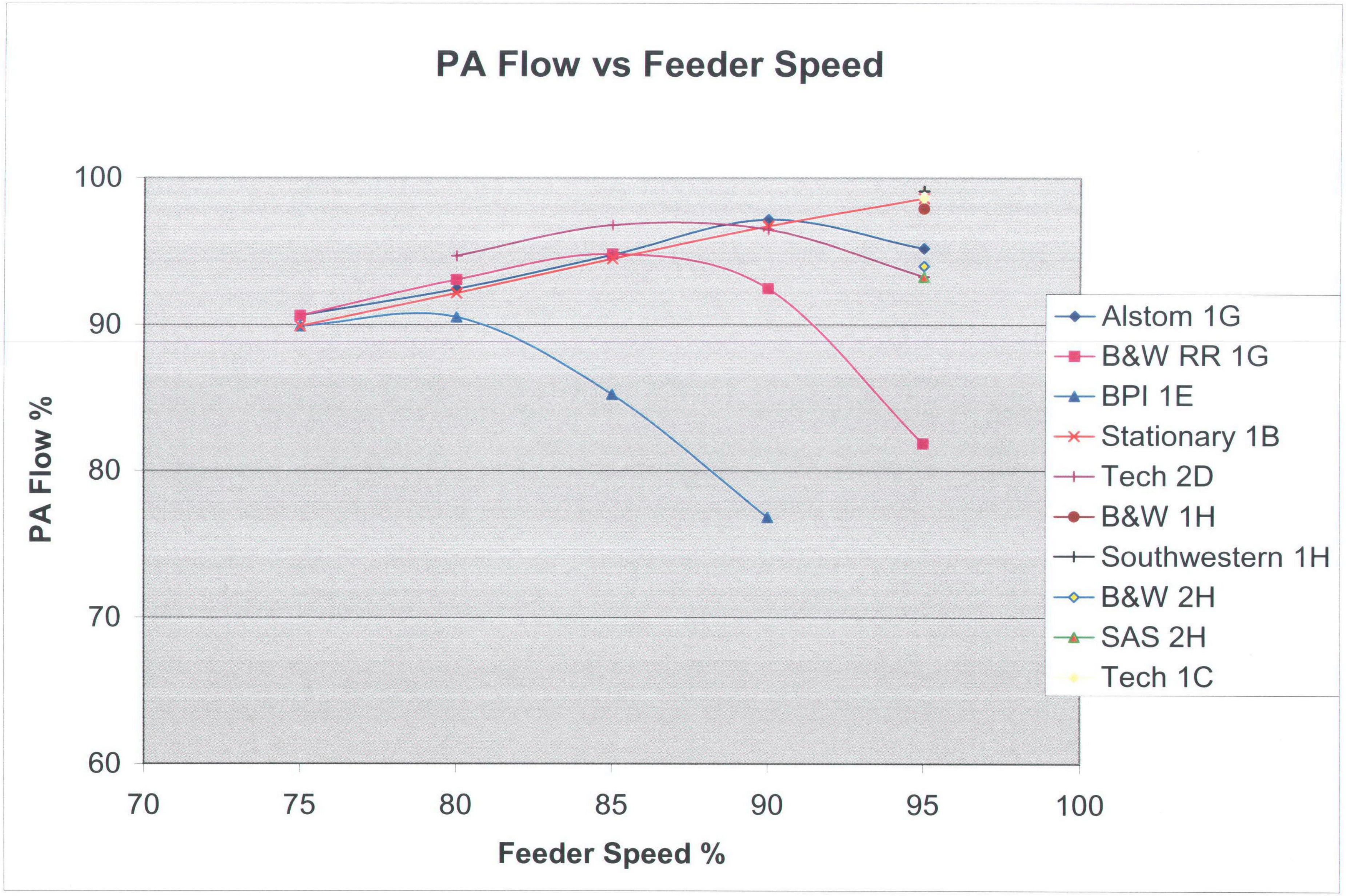
*Contract coal - 48 HGI and air dry loss < 4%.
Expected is found from fineness correction vs % through 200 mesh graph.

	A PULV	B PULV	C PULV	D PULV	E PULV	F PULV	G PULV	H PULV
Fineness Correction	1.118422	1.086172	1.027619	1.044731	1.111325	1.112265	1.133250	1.089580
Expected	62.26	64.41	68.22	67.12	62.74	62.67	61.27	64.19

IP12_003034


PA Flow vs Feeder Speed
Pulv D/P
" wc
30
25
20
15
10
5
0
70
75
80
85
90
95
100
Feeder Speed %
Alstom 1G
B&W RR 1G
BPI 1E
Stationary 1B
Tech 2D
B&W 1H
Southwestern 1H
B&W 2H
SAS 2H
Tech 1C

Aug 30, '04



PA Flow vs Feeder Speed
PA Flow %
100
90
80
70
60
70
75
80
85
90
95
100
Feeder Speed %
Alstom 1G
B&W RR 1G
BPI 1E
Stationary 1B
Tech 2D
B&W 1H
Southwestern 1H
B&W 2H
SAS 2H
Tech 1C

Aug 30, 04

The Babcock & Wilcox Company
Generating Powerful Solutions™

Quotation
No. 00033501

Replacement Parts
Customer Copy

B&W CONTACT INFORMATION	QUOTE PREPARED FORCUSTOMER RFQ REF.#: STATIONARY THROAT ASSY	GENERAL INFORMATION
TELEPHONE: (800) 354-4400 NEW QUOTATIONS AND ORDERS: OPTION 1 QUOTE AND ORDER STATUS: OPTION 2 PROBLEM RESOLUTION: OPTION 3 REISSUE OF DOCUMENTATION: OPTION 4 **FAX:** (330) 860-9350 **WEB SITE:** WWW.BABCOCK.COM **MAIL ADDRESS:** P.O. BOX 665 BARBERTON, OH 44203-0665	INTERMOUNTAIN POWER SERVICE ATTENTION: ALAN DEWSNUP 850 WEST BRUSH WELLMAN ROAD DELTA, UT 84624-9522 **E-MAILED TO:** **DPMENSTER@BABCOCK.COM**	**B&W CUSTOMER NUMBER:** U041681001 **SALESMAN:** D DALLOF **TAKEN BY:** SME1 **PAYMENT TERMS:** 0.00% 0 DAYS, NET 30 **FREIGHT:** PREPAID & ADD **FOB:** POINT OF SHIPMENT **OEM CONTRACT REF.#:** RB-614/15 **QUOTE VALID UNTIL:** 10/16/2004

ITEM #	DESCRIPTION	B&W PART NO. / CUSTOMER PART NO.	QUANTITY	UNIT PRICE / UNIT WEIGHT	EXT'D PRICE / LEADTIME
	NOTE: . THE PRICE OF ITEM ONE INCLUDES CHARGES TO ESTABLISH A NEW PATTERN. THE FIRST PURCHASE OF THIS ITEM WOULD BE AT THE ITEM ONE PRICE. SUBSEQUENT PURCHASE WOULD NOT INCLUDE PATTERN CHARGES AND WOULD BE PURCHASED AT THE PRICE SHOWN IN ITEM TWO. .				
001	REPLACEMENT STATIONARY THROAT ASSEMBLY * 7 LOWER THROAT SEGMENTS HIGH TEMP IRON ALLOY * 14 UPPER THROAT SEGMENTS VAM 20 * 14 LEDGE COVER SEGMENTS VAM 20 * ALL NECESSARY HARDWARE . NOTE: THE PRICE FOR THIS ITEM INCLUDES TOOLING CHARGES TO ESTABLISH A NEW PATTERN. .	**00033501001**	1 EA	$78,660.00 0	**$78,660.00** **28 WEEKS**
002	REPLACEMENT STATIONARY THROAT ASSEMBLY * 7 LOWER THROAT SEGMENTS HIGH TEMP IRON ALLOY * 14 UPPER THROAT SEGMENTS VAM 20	**00033501002**	1 EA	$58,330.00 0	**$58,330.00** **28 WEEKS**

09:59:38
09/16/2004

The Babcock & Wilcox Company
Generating Powerful Solutions

Quotation
No. 00033501

Replacement Parts
Customer Copy

ITEM #	DESCRIPTION	B&W PART NO. / CUSTOMER PART NO.	QUANTITY	UNIT PRICE / UNIT WEIGHT	EXT'D PRICE / LEADTIME
	* 14 LEDGE COVER SEGMENTS VAM 20 * ALL NECESSARY HARDWARE				
003	LOT,MATERIAL SURCHARGE DUE TO THE PRICE VOLATILITY OF THE STEEL MARKET, THE PRICE AND DELIVERY OF THE ABOVE ITEM(S) MAY BE ADJUSTED AT THE TIME OF ORDER BASED ON APPLICABLE MATERIAL SURCHARGES. NO FABRICATION WILL BE RELEASED PRIOR TO YOUR ACKNOWLEDGEMENT AND APPROVAL OF THE SAME.	**2363940**	1 LT	$0.00 0 1.	**$0.00** **0 DAYS**

TOTAL PRICE **$136,990.00**

WHEN COMMUNICATING WITH B&W, PLEASE USE THE B&W QUOTATION NUMBER AND B&W PART NUMBERS HIGHLIGHTED ABOVE. ANY DEVIATIONS IN THE QUANTITY OF ITEMS ORDERED FROM THE QUANTITY OF ITEMS QUOTED MAY CAUSE A CHANGE IN PRICE AND DELIVERY. THE SHIP DATE STATED WITH EACH ITEM ABOVE IS BASED ON THE RECEIPT DATE OF YOUR PURCHASE ORDER AND QUOTED LEADTIMES.

"THANK YOU FOR YOUR INQUIRY. NOTWITHSTANDING THE TERMS AND CONDITIONS ON YOUR REQUEST FOR QUOTATION, WE ARE PROCESSING THIS QUOTATION IN ACCORDANCE WITH THE TERMS AND CONDITIONS CONTAINED ON THE LAST PAGE OF THIS ACKNOWLEDGEMENT. SUCH TERMS SHALL APPLY TO ALL GOODS AND SERVICES PROVIDED HEREUNDER. PLEASE NOTIFY US IMMEDIATELY IF YOU HAVE ANY OBJECTIONS."

09:59:38
09/16/2004

Babcock & Wilcox
a McDermott company

Quotation No. 00027660

B&W Service Company Replacement Parts
Customer Copy

B&W CONTACT INFORMATION	QUOTE PREPARED FOR CUSTOMER RFQ REF.#: LOWER THROAT SEGMENTS	GENERAL INFORMATION
TELEPHONE: (800) 354-4400 NEW QUOTATIONS AND ORDERS: OPTION 1 QUOTE AND ORDER STATUS: OPTION 2 PROBLEM RESOLUTION: OPTION 3 REISSUE OF DOCUMENTATION: OPTION 4 FAX: (330) 860-9350 WEB SITE: WWW.BABCOCK.COM MAIL ADDRESS: P.O. BOX 665 BARBERTON, OH 44203-0665	INTERMOUNTAIN POWER SERVICE ATTENTION: ALAN DEWSNUP 850 WEST BRUSH WELLMAN ROAD DELTA, UT 84624-9522 E-MAILED TO: DPMENSTER@BABCOCK.COM	B&W CUSTOMER NUMBER: U041681001 SALESMAN: D DALLOF TAKEN BY: SAR1 PAYMENT TERMS: 0.00% 0 DAYS, NET 30 FREIGHT: PREPAID & ADD FOB: POINT OF SHIPMENT OEM CONTRACT REF.#: RB-614-615 QUOTE VALID UNTIL: 07/25/2003

ITEM #	DESCRIPTION	B&W PART NO. / CUSTOMER PART NO.	QUANTITY	UNIT PRICE / UNIT WEIGHT	EXT'D PRICE / LEADTIME
	NOTE: DUE TO THE EXTENSIVE LEADTIME AND PATTERN CHARGES INVOLVED WITH ITEM ONE (STATIONARY LOWER THROAT SEGMENTS), WE ARE OFFERING ITEM TWO (LOW PRESSURE DROP ROTATING THROAT) AS AN ALTERNATE. THIS ITEM IS BEING QUOTED AT A REDUCED PRICE FROM OUR OFFERING LAST YEAR.				
001	LOWER THROAT SEGMENTS VAM20 ONE COMPLETE LOWER THROAT RING, CUT INTO SEVEN INDIVIDUAL SEGMENTS FOR EASE OF INSTALLATION. SEGMENTS MACHINED FOR SPLICE PLATES TO SECURE THE ASSEMBLY.	00027660001	1 EA	$39,525.00 0	$39,525.00 20 WEEKS
002	ALTERNATE TO ITEM 001 B&W CAST, "LOW PRESSURE DROP" ROTATING THROAT ASSEMBLY. AS GENERALLY DESCRIBED IN OUR PREVIOUS QUOTATION Q23684.	00027660002	1 LT	$38,750.00 0	$38,750.00 20 WEEKS
				TOTAL PRICE	$39,525.00

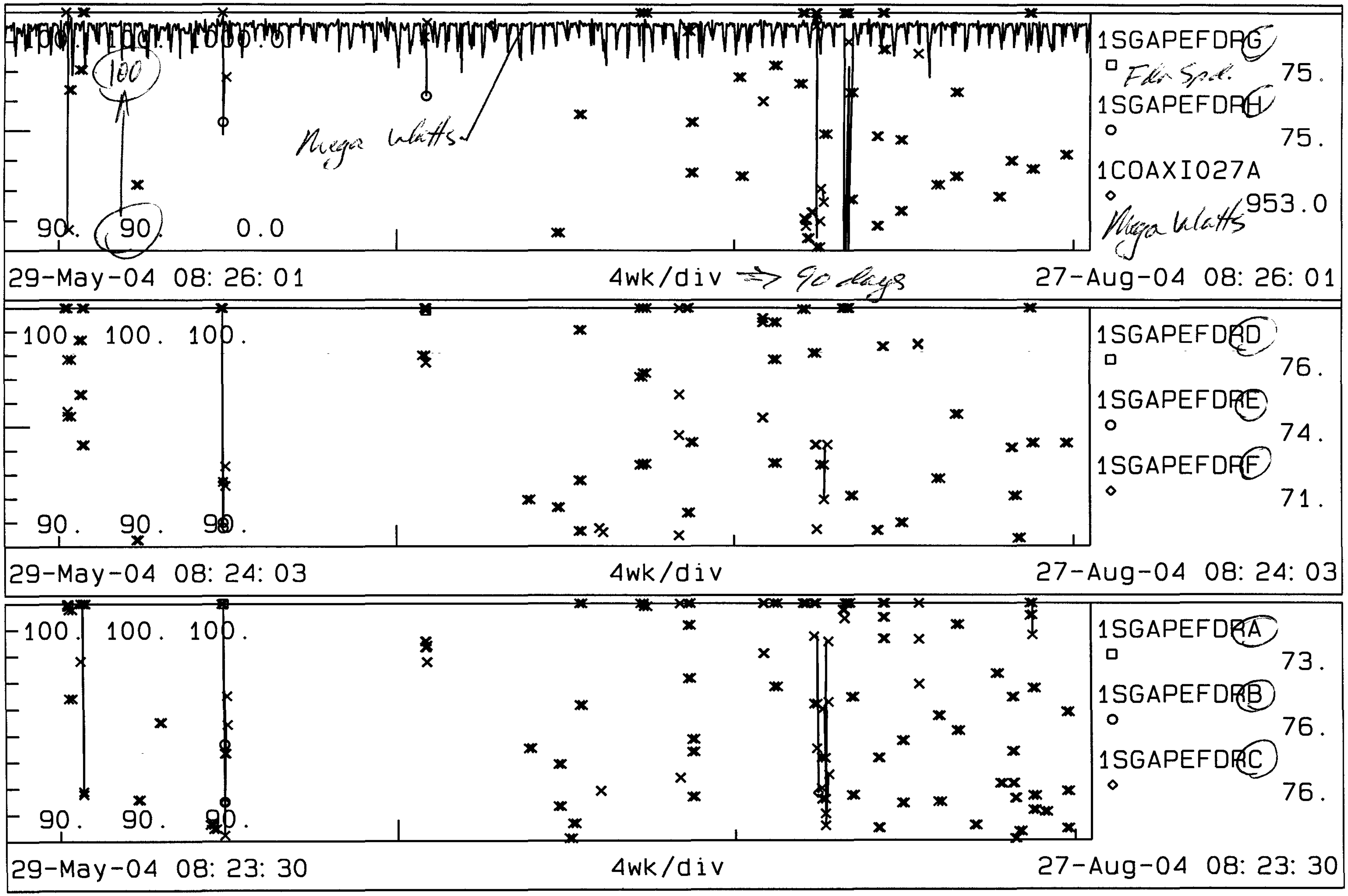
WHEN COMMUNICATING WITH B&W, PLEASE USE THE B&W QUOTATION NUMBER AND B&W PART NUMBERS HIGHLIGHTED ABOVE. ANY DEVIATIONS IN THE QUANTITY OF ITEMS ORDERED FROM THE QUANTITY OF ITEMS QUOTED MAY CAUSE A CHANGE IN PRICE AND DELIVERY. THE SHIP DATE STATED WITH EACH ITEM ABOVE IS BASED ON THE RECEIPT DATE OF YOUR PURCHASE ORDER AND QUOTED LEADTIMES.

"THANK YOU FOR YOUR INQUIRY. NOTWITHSTANDING THE TERMS AND CONDITIONS ON YOUR REQUEST FOR QUOTATION, WE ARE PROCESSING THIS QUOTATION IN ACCORDANCE WITH THE TERMS AND CONDITIONS CONTAINED ON THE LAST PAGE OF THIS ACKNOWLEDGEMENT. SUCH TERMS SHALL APPLY TO ALL GOODS AND SERVICES PROVIDED HEREUNDER. PLEASE NOTIFY US IMMEDIATELY IF YOU HAVE ANY OBJECTIONS."

13:21:58
07/08/2003

Printed out for: PHIL-H - 27-Aug-04 08:16:54 Unit 1 Feeder Speeds

0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 08:16:54



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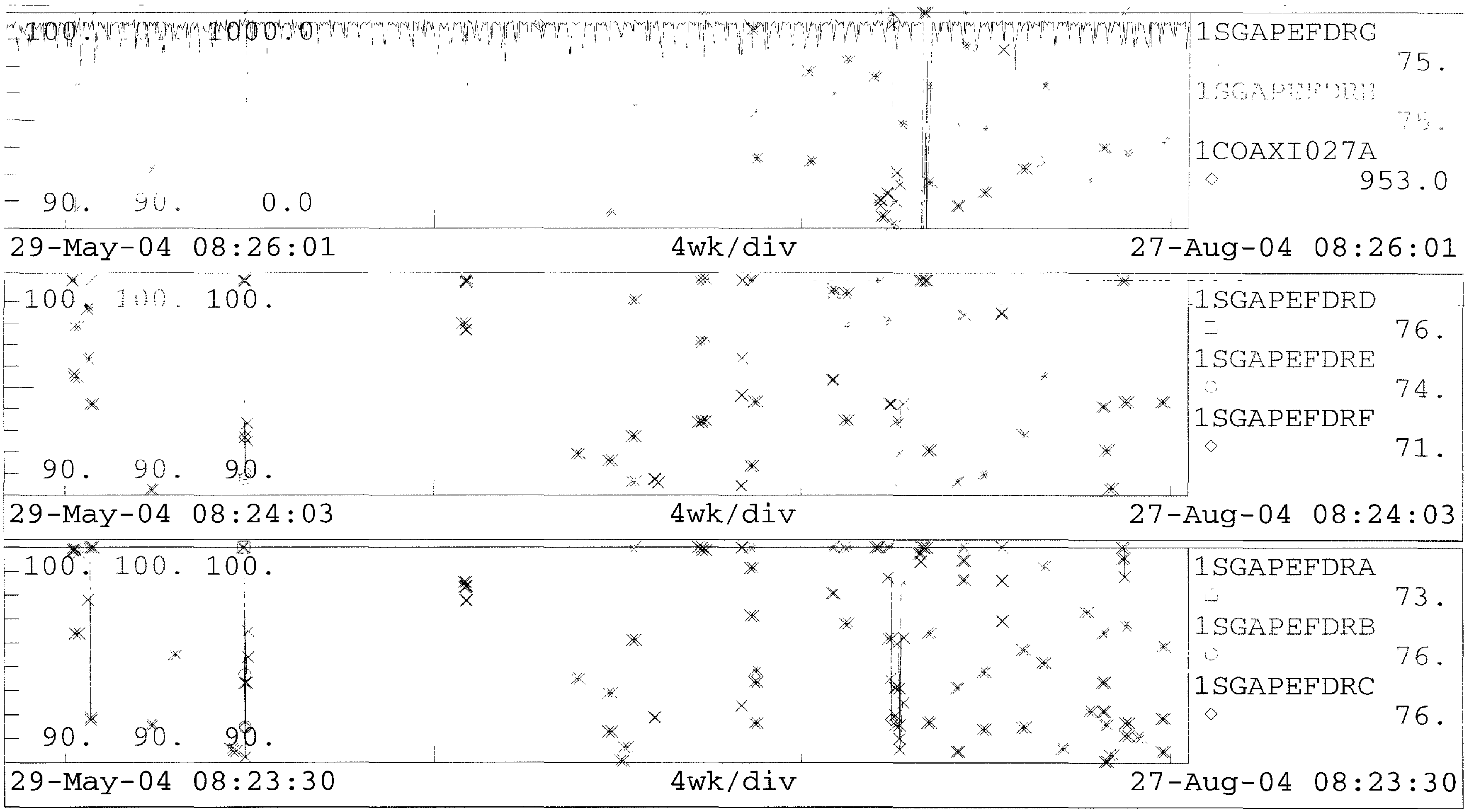
No apparent continuous operation at 95% Feeder Speed over a 90-day period.

Printed out for: PHIL-H - 27-Aug-04 08:17:00
0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 08:17:00



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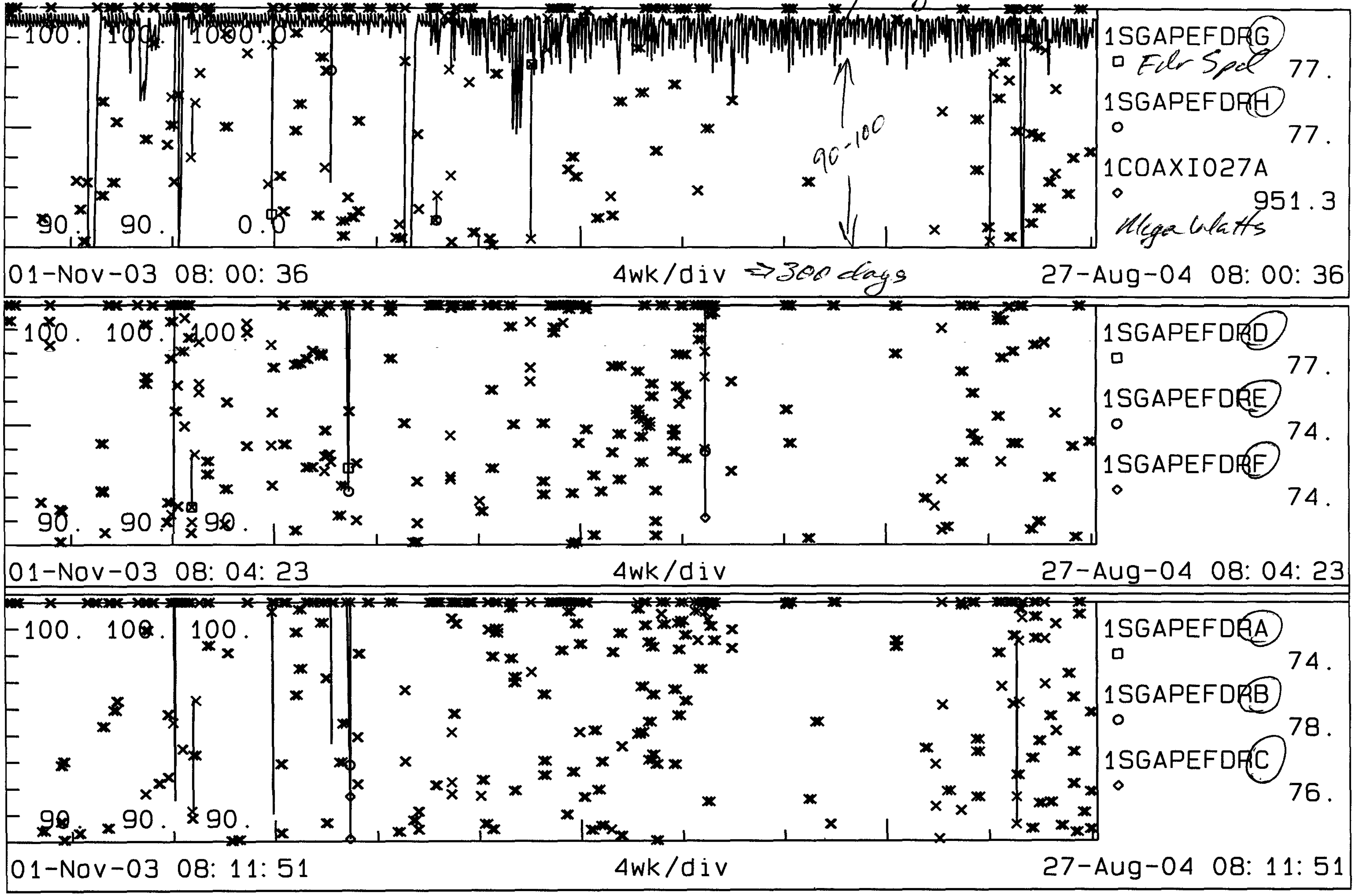
IP12_003041

[redacted]inted out for: PHIL-H - 27-Aug-04 08: 03: 19 *Unit 1 Fdr Speeds*

0 Messages U1 Pulv U1 Pulv Operating data *Mega Watts* 27-Aug-04 08: 03: 19

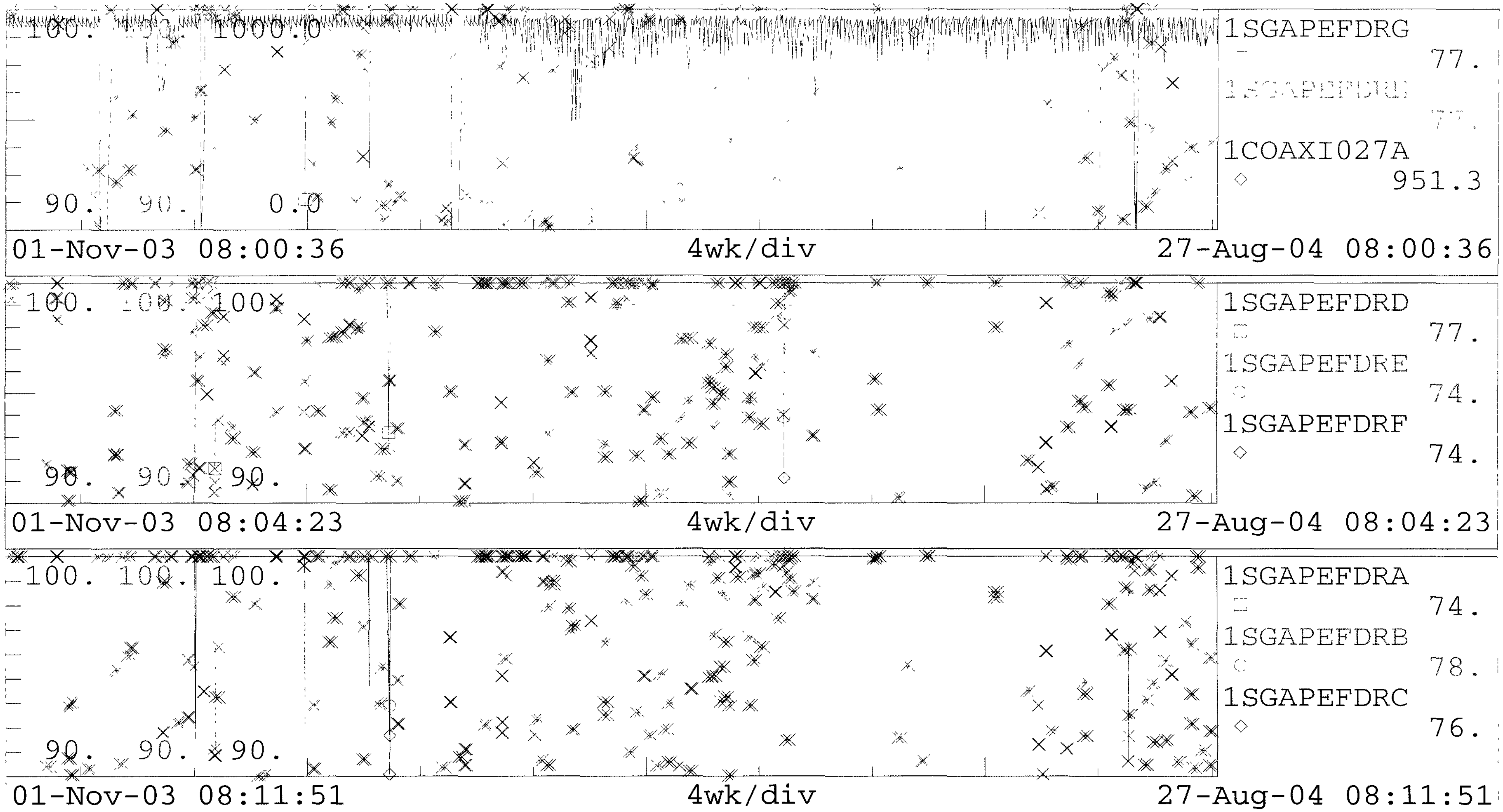


EndTim= 27-Aug-04 08: 03: 19 /EvalTim= 27-Aug-04 08: 03: 19 /PanRate= 0

No apparent continuous operation at 95% Feeder Speed for 300-day period.

IP12_003042

Printed out for: PHIL-H - 27-Aug-04 08:03:35
0 Messages U1 Pulv U1 Pulv Operating data 27-Aug-04 08:03:35

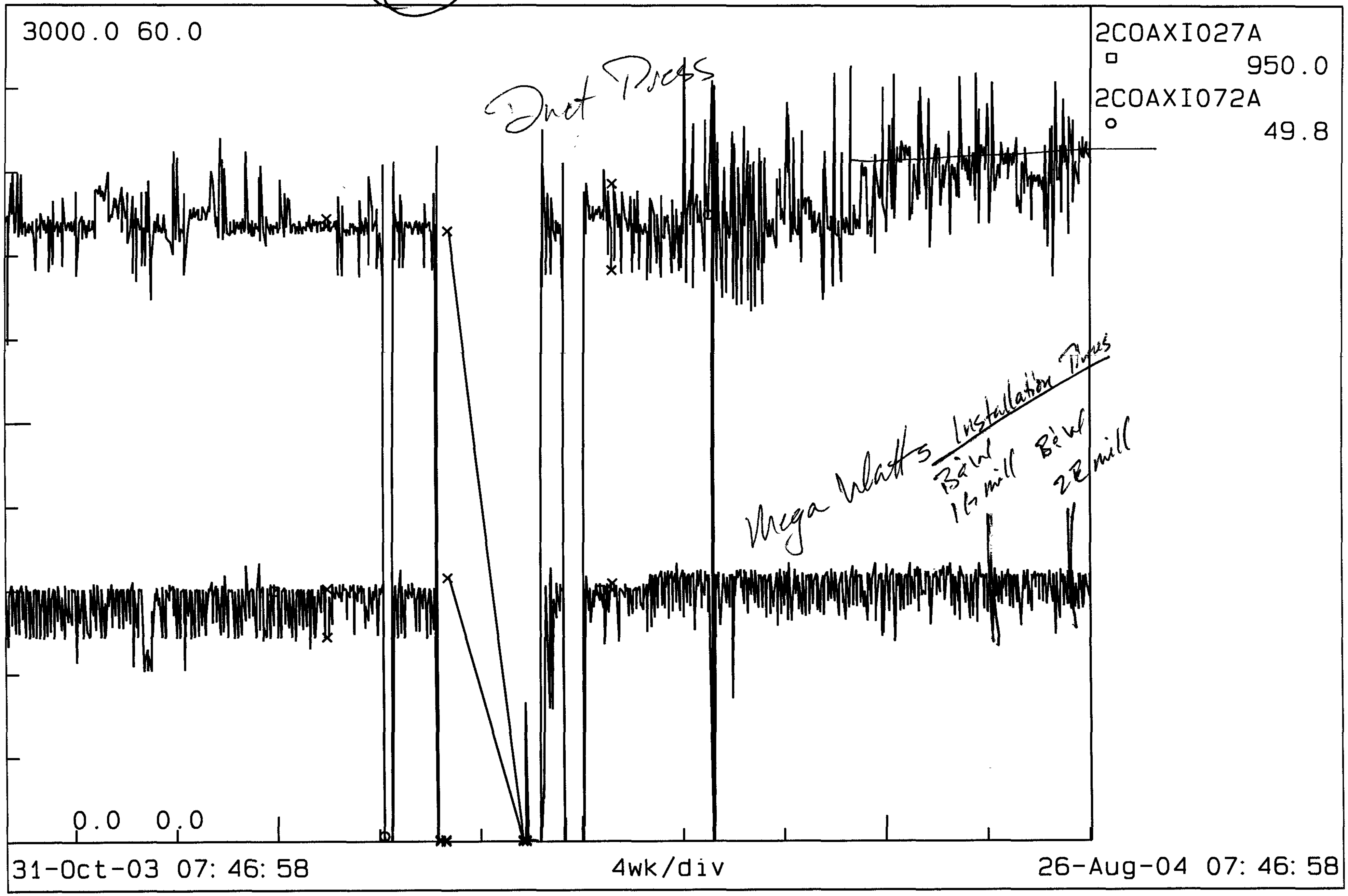


EndTim= 27-Aug-04 08:03:35 /EvalTim= 27-Aug-04 08:03:35 /PanRate= 0

[redacted]inted out for: PHIL-H - 26-Aug-04 07:41:01

Unit 2

0 Messages U2 Pulv U2 Pulv Operating data 26-Aug-04 07:41:01



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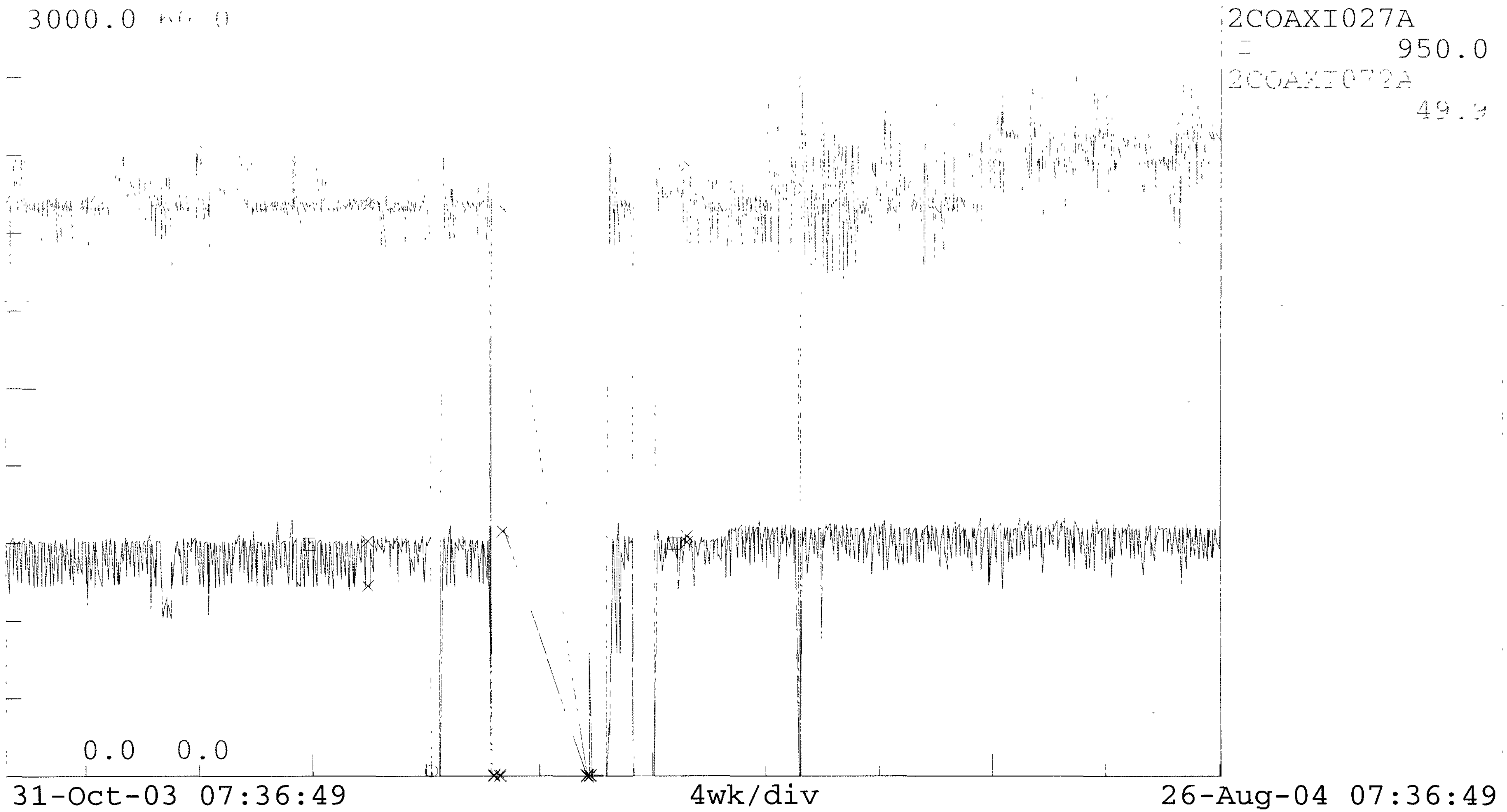
Duct Pressure has been > 44" wc for months. No correlation w/ B&W Throats (1G, 2E)

IP12_003044

Printed out for: PHIL-H - 26-Aug-04 07:27:40

0 Messages U2 Pulv U2 Pulv Operating data 26-Aug-04 07:27:40



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[redacted]inted out for: PHIL-H - 27-Aug-04 08: 31: 53

0 Messages U1 Pulv 2 Unit 1 Pulv data 27-Aug-04 08: 31: 53

Unit 1 909.8 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Burner Location	3rd row Front	1st row Front	2nd row Rear	4th row Rear	4th row Front	2nd row Front	1st row Rear	3rd row Rear
Motors						TECO	TECO	
Pulv Status	ON	ON	ON	ON	OFF	ON	ON	ON
Feeder Speed	69.9	71.9	71.6	71.0	74.3	67.5	70.8	70.5
Amps	56.4	72.5	69.5	69.5	0.0	56.9	45.0	67.7
Stator Temp (C)	95.0	99.0	117.	111.	63.6	69.8	58.8	130.
Mtr Brg Temp-IB	153.	147.	146.	144.	92.9	143.	140.	132.
Mtr Brg Temp-OB	123.	136.	138.	120.	92.1	129.	126.	139.
Rotating Throat			Tech		BPI		B&W RR	B&W
Backplate Ave T	965.	867.	895.	925.	1177.	923.	923.	951.
SA Damper Pos	67.6	68.0	71.6	68.2	10.0	68.1	67.8	64.7
SA Windbox Press	1.5	1.1	1.4	1.2	0.0	1.6	0.0	0.6
Coal Pipe Ave T	637.	621.	526.	630.	911.	639.	620.	621.
							Alstom	

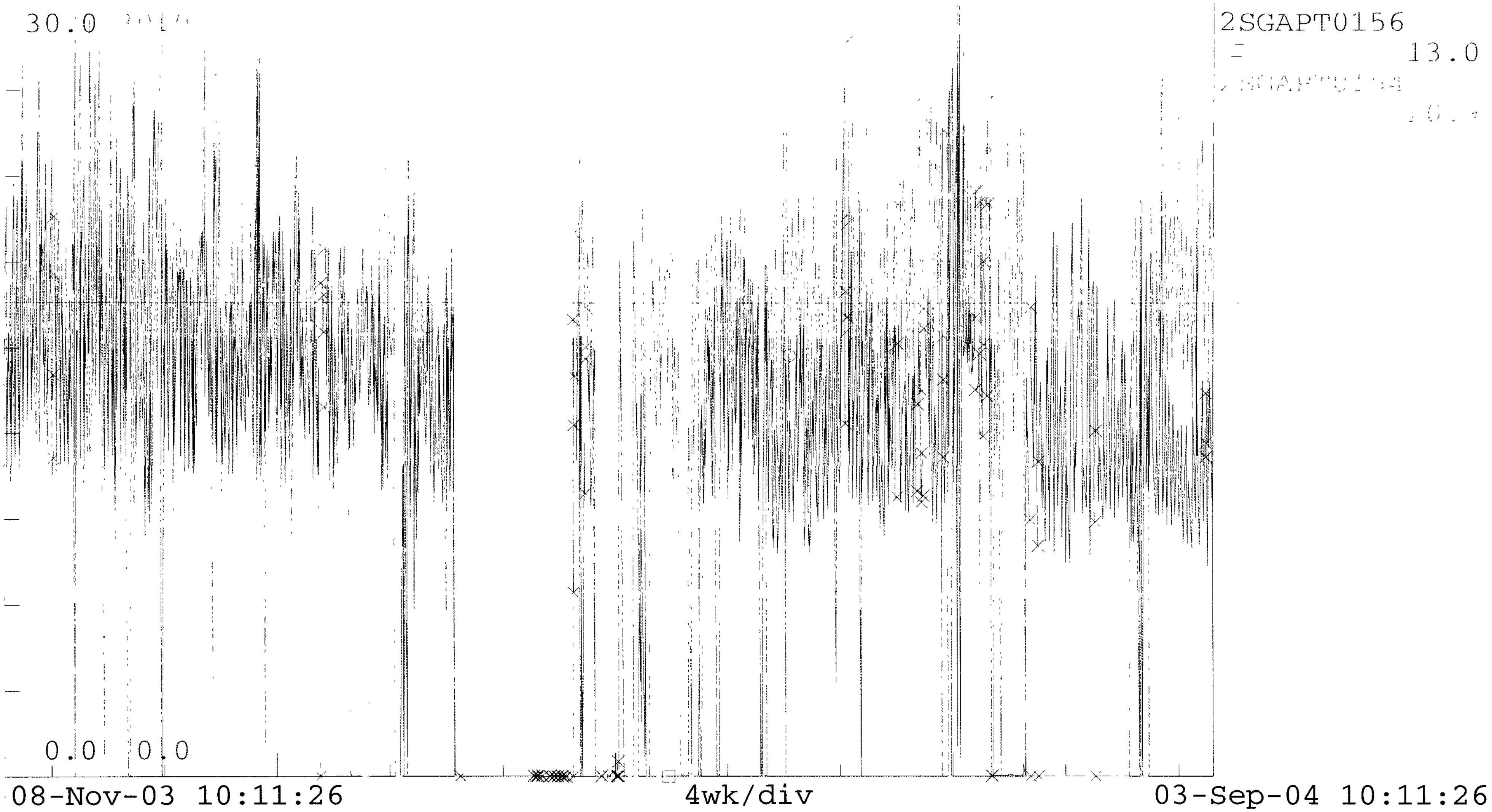
EndTim= 27-Aug-04 08: 31: 53 /EvalTim= 27-Aug-04 08: 31: 53 /PanRate= 0

inted out for: PHIL-H - 27-Aug-04 08: 32: 24
0 Messages U2 PULV 2 Unit 2 Pulv Data 27-Aug-04 08: 32: 24

Unit 2 908.3 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Burner Location	3rd row Front	1st row Front	2nd row Rear	4th row Rear	4th row Front	2nd row Front	1st row Rear	3rd row Rear
Pulv Status	ON	OFF	ON	ON	ON	ON	ON	ON
Feeder Speed	72.2	0.1	73.4	74.1	73.7	74.0	69.7	73.4
Amps	64.6	0.0	61.3	67.3	58.8	66.4	65.2	72.0
Stator Temp (C)	89.5	55.7	83.0	121.	80.3	156.	96.9	107.
Mtr Brg Temp-IB	143.	86.0	149.	157.	138.	161.	163.	168.
Mtr Brg Temp-OB	130.	79.1	126.	138.	131.	127.	133.	146.
Rotating Throat				Tech	B&W RR			
Backplate Ave T	0.	19.	16.	93.	20.	212.	38.	0.
SA Damper Pos	67.5	23.0	66.7	71.5	72.0	71.9	62.4	67.4
SA Windbox Press	1.6	0.0	1.3	1.5	1.7	1.6	0.8	1.5
Coal Pipe Ave T	0.	0.	40.	173.	20.	0.	41.	0.

EndTim= 27-Aug-04 08: 32: 24 /EvalTim= 27-Aug-04 08: 32: 24 /PanRate= 0

Printed out for: PHIL-H - 03-Sep-04 10:03:17
0 Messages U2 Pulv U2 Pulv Operating data 03-Sep-04 10:03:17



EndTim= 03-Sep-04 10:03:17 /EvalTim= 03-Sep-04 10:03:17 /PanRate= 0

Printed out for: PHIL-H - 10-Aug-04 09:48:35

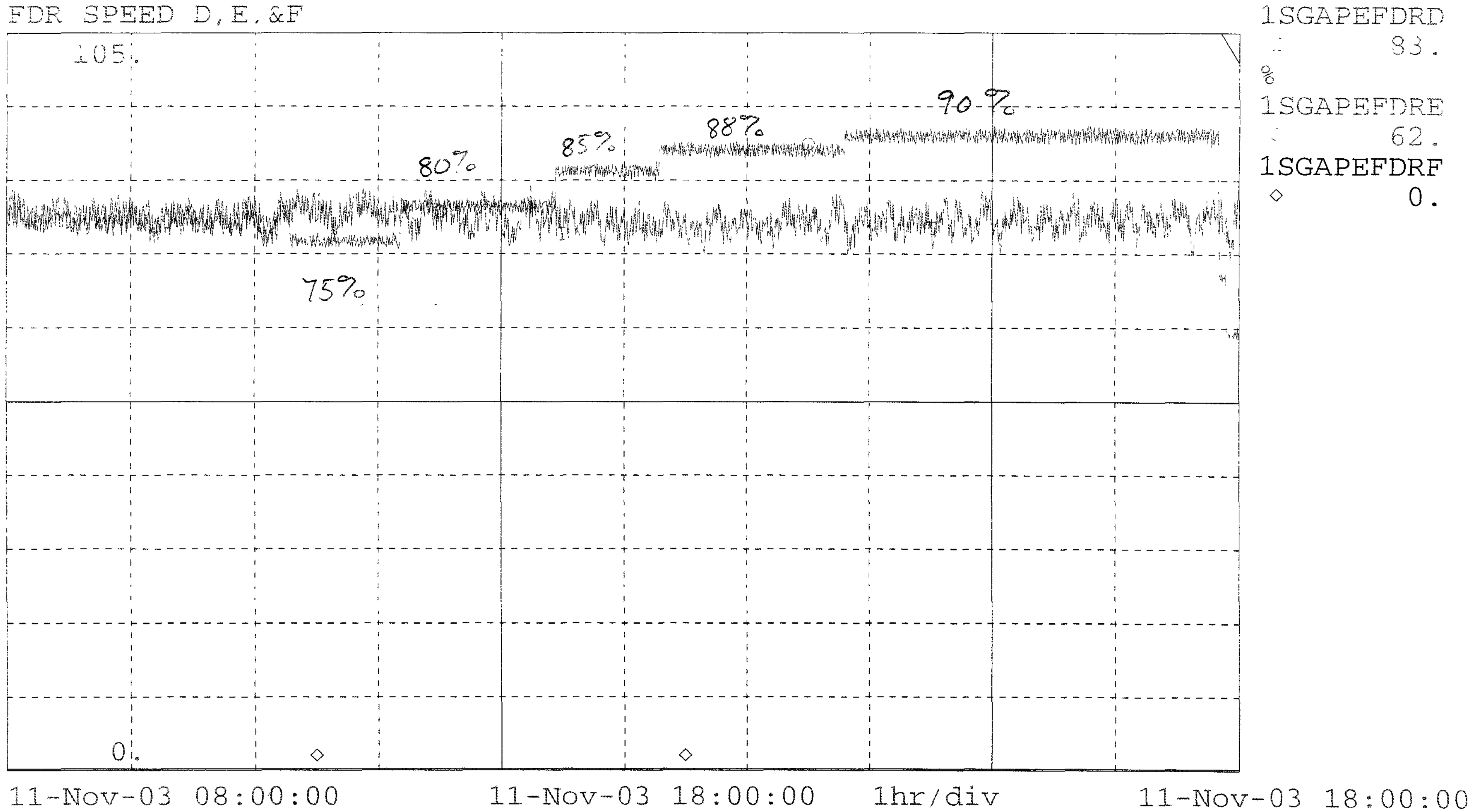
0 Messages U1 Pulv U1 Pulv Operating data 10-Aug-04 09:48:35

Unit 1 947.8 MW	Pulv A	Pulv B		Pulv D		Pulv F		
Coal Flow357.6TPH	54.8	56.8	55.4	0.1	54.8	0.2	63.9	58.6
Feeder Speed	80.5	84.2	81.3	0.1	80.9	0.2	94.4	85.0
Amps (Duct Pr44.2)	57.9	66.9	67.2	0.0	65.9	0.0	55.7	66.5
Coal Pipe Vel	4328.	4119.	4333.	1.	4307.	1.	3872.	4385.
PA Flow %	100.	92.3	99.7	0.0	97.6	0.0	88.6	100.
PA Damper Pos	95.5	81.8	89.6	0.0	89.8	0.4	100.	100.
SA Damper Pos	77.5	77.8	81.3	51.4	77.8	25.0	90.4	78.3
PA Mass Flow	3955.	3711.	3904.	1.	3866.	1.	3471.	3955.
Pulv DP (NOx 0.29)	19.5	13.4	18.9	0.1	17.4	0.0	23.7	18.1
Air to Fuel Ratio	2.13	1.96	2.11	0.44	2.09	0.19	1.63	2.05
Pulv Inlet Temp	301.8	288.8	292.2	66.5	293.6	162.9	367.8	328.5
Pulv Outlet Temp	150.9	147.3	147.7	86.4	150.1	151.1	151.4	153.1
Coal Bias	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Air Bias	6.0	0.0	6.5	0.0	5.7	11.1	0.1	12.0
Hyd Skid Pr Fdbk	4.	2278.	2257.	83.	2187.	3.	2120.	2346.
Hyd Skid Pr Setpt	2400.	2400.	2400.	1149.	2400.	1149.	2400.	2400.

EndTim= 10-Aug-04 09:48:35 /EvalTim= 10-Aug-04 09:48:35 /PanRate= 0

BPI

Printed out for: GARRY-C - 10-Aug-04 11:14:26
100 Messages unit 1 fdrCoal Feeder Speeds 10-Aug-04 11:14:26



IP12_003050

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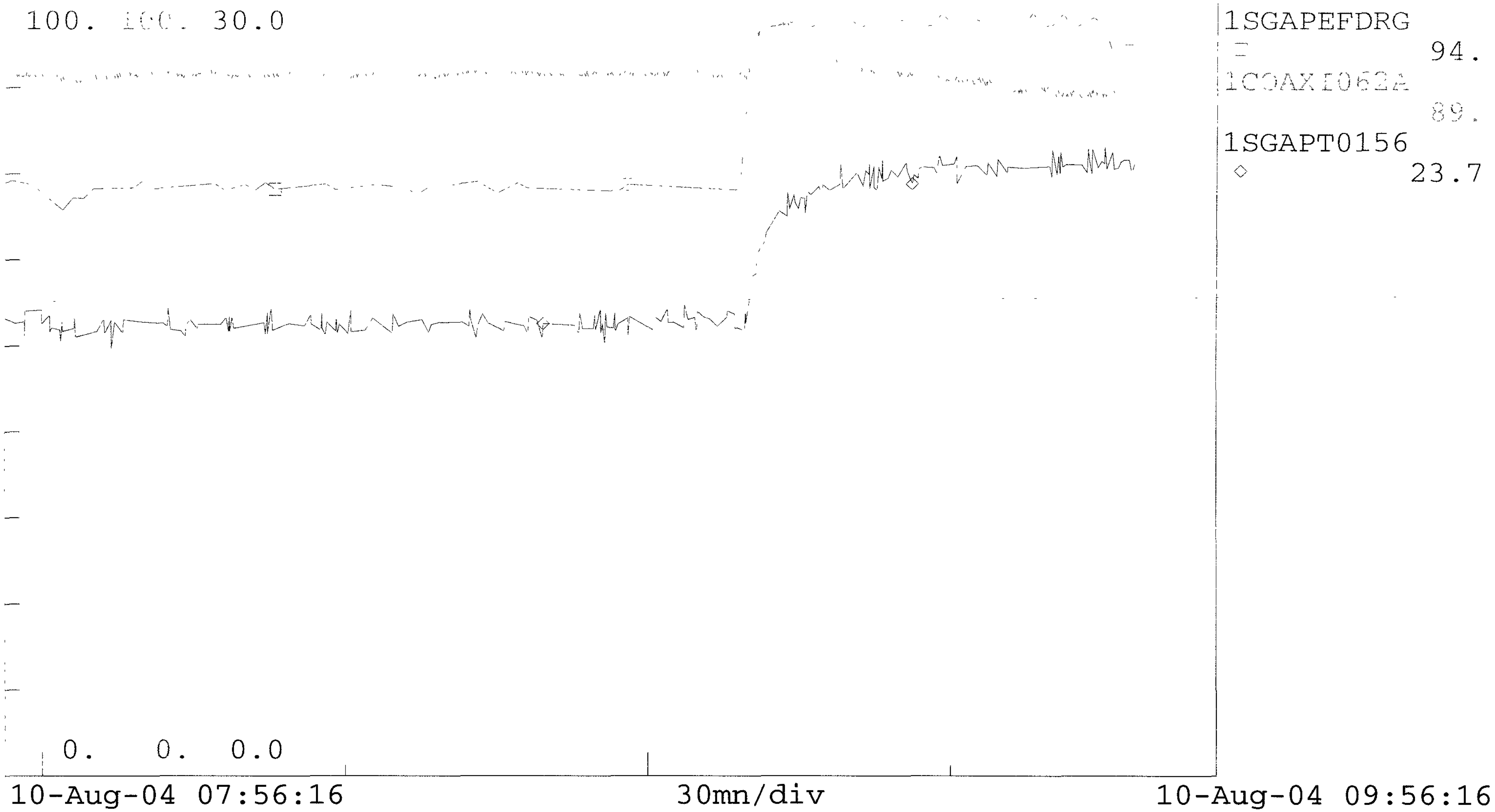

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IP12_003051

Printed out for: PHIL-H - 04-Aug-04 16:36:38

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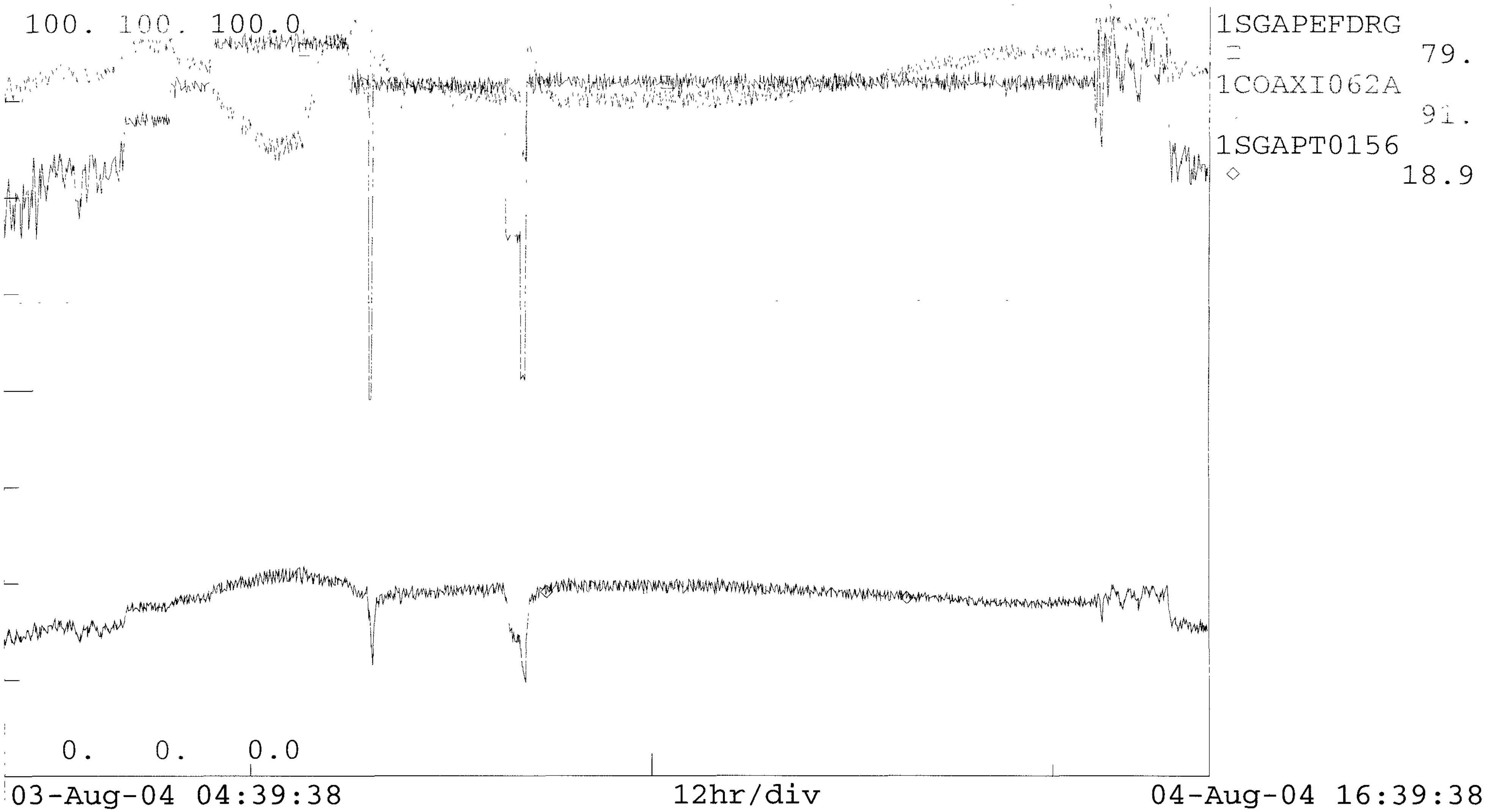

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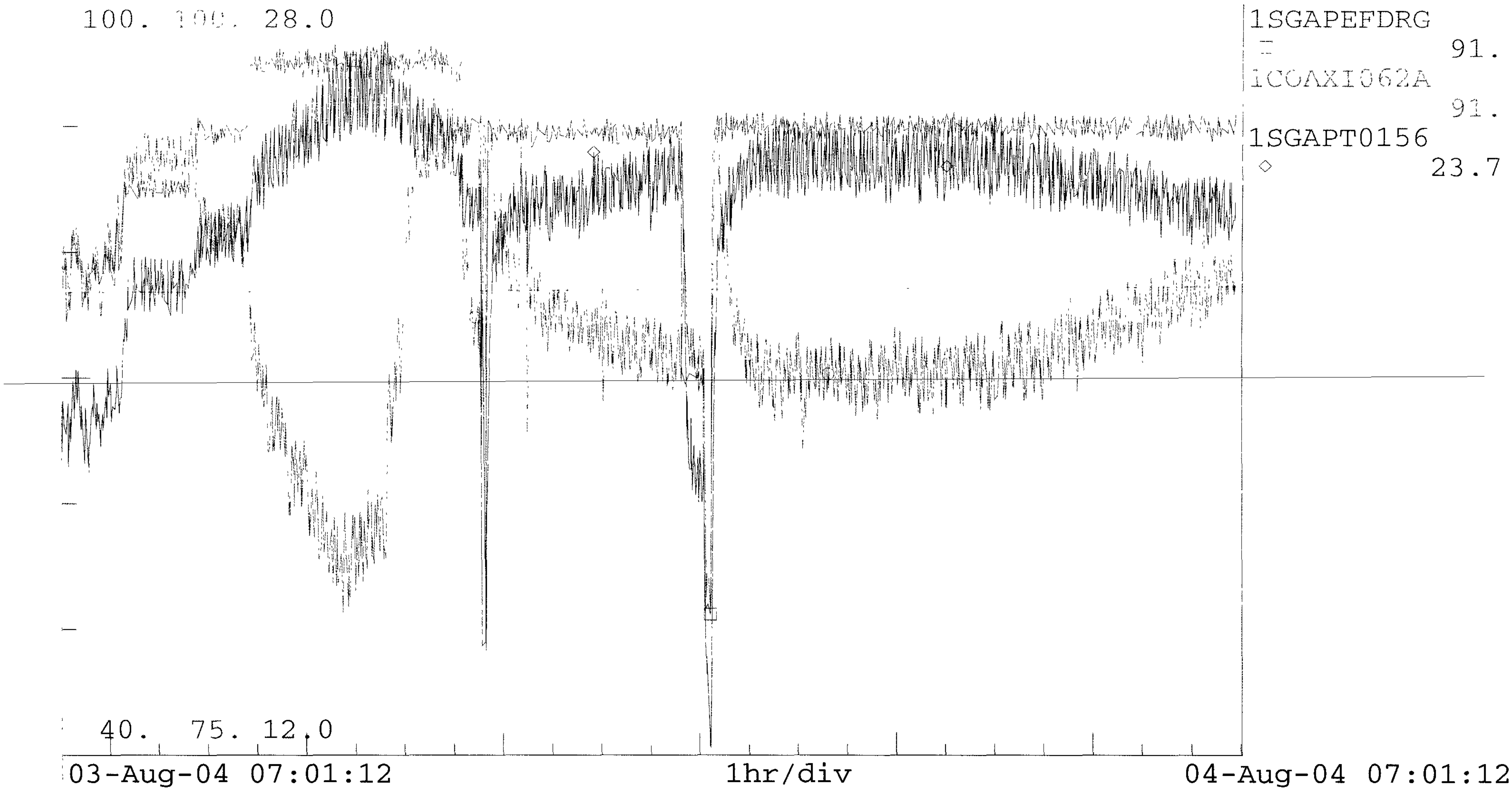
IP12_003052

Printed out for: UNIT1OP - 04-Aug-04 06:53:01

0 Messages U1 Pulv U1 Pulv Operating data 04-Aug-04 06:53:01



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IP12_003053

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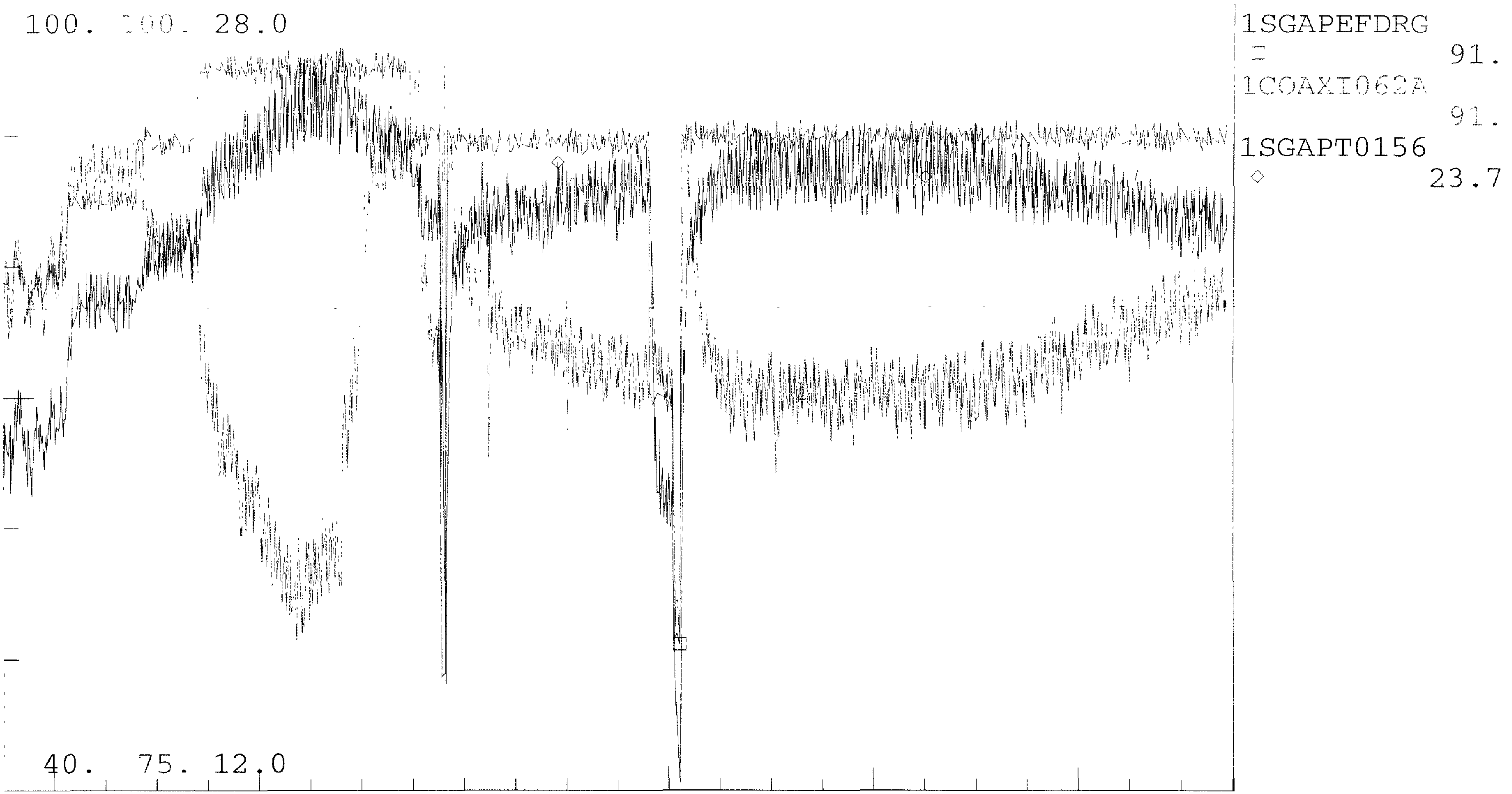

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IP12_003054

Printed out for: UOSUPER - 30-Jun-04 07:18:07
0 Messages U2 Pulv U2 Pulv Operating data 30-Jun-04 07:18:07

Unit 2 926.3 MW	Pulv A	Pulv B	Pulv C		Pulv E	Pulv F	Pulv G	
[illegible] 358.4TPH	[illegible]	[illegible]	[illegible]	[illegible]	Bad	[illegible]	[illegible]	[illegible]
Feeder Speed	87.3	89.0	1.1	88.0	Calc	74.6	95.2	87.1
Amps (Duct Pr49.2)	69.3	67.6	0.0	73.5	0.0	66.9	65.8	77.0
Coal Pipe Vel	4277.	4439.	0.	4220.	0.	4419.	4387.	4410.
PA Flow %	96.8	100.	0.0	95.9	0.0	98.9	98.0	100.
PA Damper Pos (Duct Pr	100.	91.9	0.6	97.2	1.9	81.5	83.4	99.1
SA Damper Pos	84.3	84.5	22.1	88.3	19.0	73.2	90.1	84.4
PA Mass Flow	3812.	3955.	1.	3801.	0.	3900.	3890.	3955.
Pulv DP (NOx 0.27)	25.5	24.5	0.0	25.7	0.0	22.1	22.4	22.6
Air to Fuel Ratio	1.94	1.96	0.04	1.91	Calc	2.35	1.81	2.00
Pulv Inlet Temp	300.9	314.5	101.5	312.6	102.4	308.4	336.2	348.1
Pulv Outlet Temp	148.8	151.1	89.3	150.0	87.7	149.4	149.4	148.4
Coal Bias	0.0	0.0	0.0	0.0	-2.0	-14.	6.0	0.0
Air Bias	11.5	9.6	0.0	0.0	8.5	10.1	0.0	11.1
Hyd Skid Pr Fdbk	2302.	2221.	0.	2401.	2314.	2191.	2376.	2260.
Hyd Skid Pr Setpt	2400.	2400.	1149.	1610.	1940.	2235.	2400.	2400.

EndTim= 30-Jun-04 07:18:07 /EvalTim= 30-Jun-04 07:18:07 /PanRate= 0

IP12_003055

Printed out for: UOSUPER - 30-Jun-04 07:18:03

0 Messages U2 Pulv U2 Pulv Operating data 30-Jun-04 07:18:03

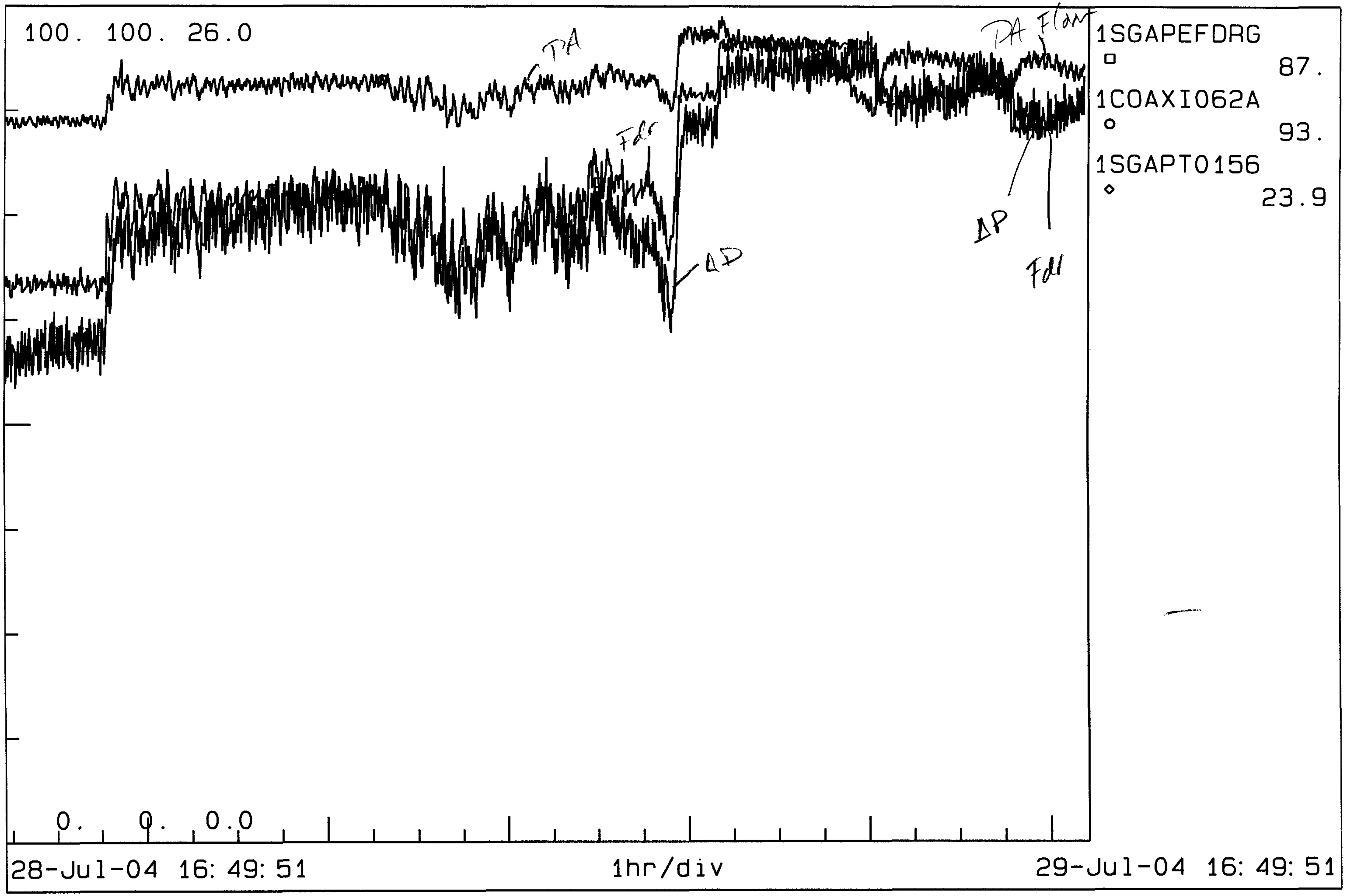
Unit 2 926.3 MW	Pulv A	Pulv B	Pulv C		Pulv E	Pulv F	Pulv G	
Coal Flow358.4TPH	[illegible]	[illegible]	[illegible]	[illegible]	BadI	[illegible]	64.6	[illegible]
Feeder Speed	87.3	89.0	1.1	88.0	Calc	74.6	95.2	87.1
Amps (Duct Pr49.2)	69.3	67.6	0.6	73.5	0.0	66.9	65.8	77.0
Coal Pipe Vel	4277.	4439.	0.	4220.	0.	4419.	4387.	4410.
PA Flow %	96.8	100.	[illegible]	95.9	0.0	98.9	98.0	100.
PA Damper Pos (Duct Pr	100.	91.9	0.6	97.2	1.9	81.5	83.4	99.1
SA Damper Pos	84.3	84.5	22.1	88.3	19.0	73.2	90.1	84.4
PA Mass Flow	3812.	3955.	1.	3801.	0.	3900.	3890.	3955.
Pulv DP (NOx 0.27)	25.5	24.5	0.0	25.7	0.0	22.1	22.4	22.6
Air to Fuel Ratio	1.94	1.96	0.04	1.91	Calc	2.35	1.81	2.00
Pulv Inlet Temp	300.9	314.5	101.5	312.6	102.4	308.4	336.2	348.1
Pulv Outlet Temp	148.8	151.1	89.3	150.0	87.7	149.4	149.4	148.4
Coal Bias	0.0	0.0	0.0	0.0	-2.0	-14.	6.0	0.0
Air Bias	11.5	9.6	0.0	0.0	8.5	10.1	0.0	11.1
Hyd Skid Pr Fdbk	2302.	2221.	0.	2401.	2314.	2191.	2376.	2260.
Hyd Skid Pr Setpt	2400.	2400.	1149.	1610.	1940.	2235.	2400.	2400.

EndTim= 30-Jun-04 07:18:03 /EvalTim= 30-Jun-04 07:18:03 /PanRate= 0

IP12_003056

Printed out for: PHIL-H - 29-Jul-04 16:44:18

0 Messages U1 Pulv U1 Pulv Operating data 29-Jul-04 16:44:18



EndTim= 29-Jul-04 16:44:18 /EvalTim= 29-Jul-04 16:44:18 /PanRate= 0

IP12_003057

Printed out for: PHIL-H - 29-Jul-04 16:44:33

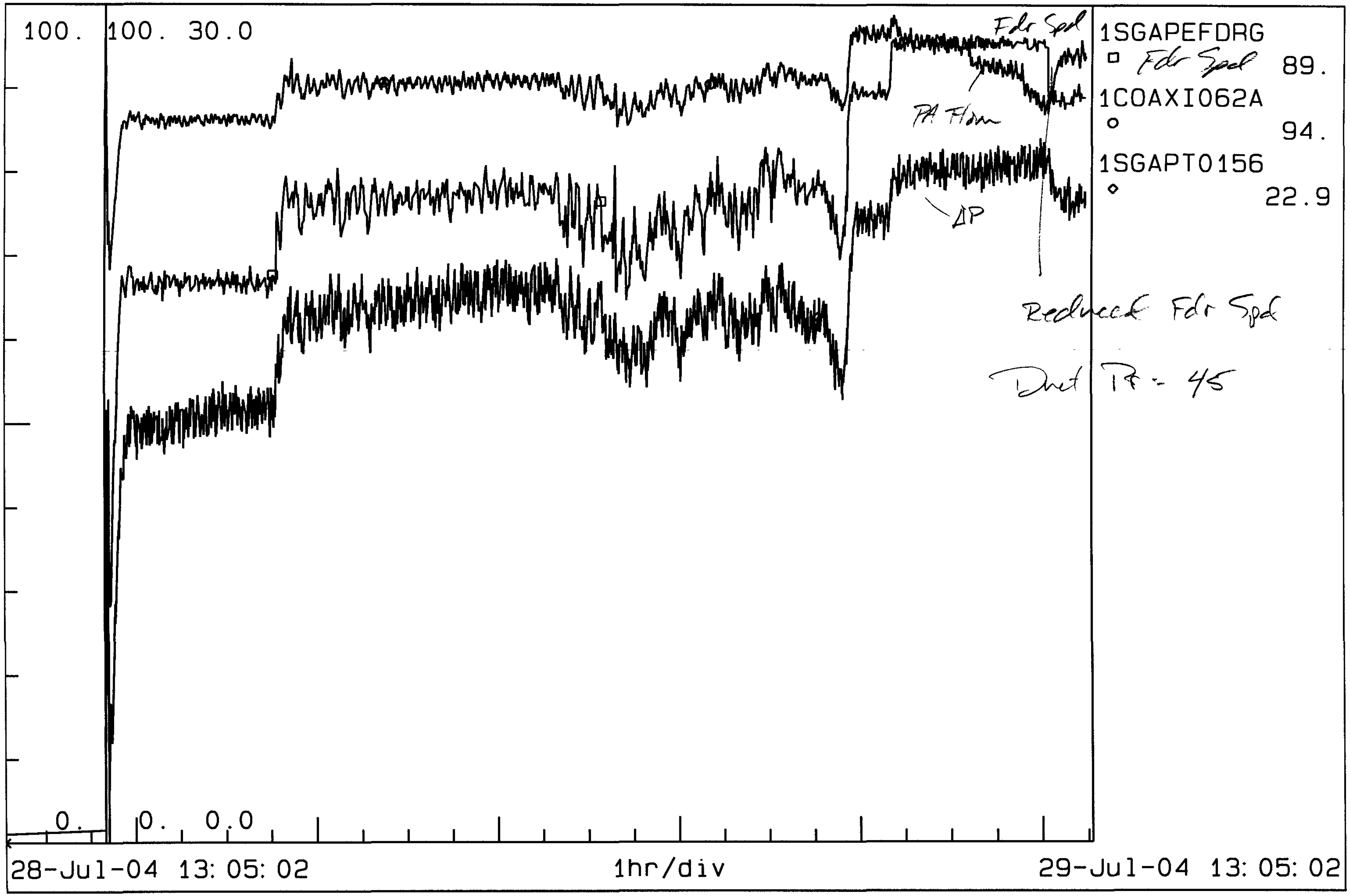
0 Messages U1 Pulv U1 Pulv Operating data 29-Jul-04 16:44:33

Unit 1 949.5MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow360.8TPH	BadI	50.9	50.3	50.4	49.4	46.9	58.7	51.1
Feeder Speed	Calc	75.8	73.8	74.4	73.4	70.1	86.0	77.3
Amps (Duct Pr44.1)	0.0	66.5	63.4	64.2	63.0	47.7	47.4	66.4
Coal Pipe Vel	5.	3936.	4249.	3909.	3938.	4398.	4099.	4340.
PA Flow %	0.1	88.5	95.4	88.5	88.0	97.9	92.3	97.3
PA Damper Pos	0.0	77.0	75.9	73.1	77.1	85.0	99.7	81.0
SA Damper Pos	35.0	66.8	70.3	67.0	66.9	65.5	83.3	67.7
PA Mass Flow	5.	3502.	3791.	3517.	3508.	3880.	3680.	3859.
Pulv DP (NOx 0.35)	0.0	10.5	13.6	13.0	13.2	16.0	23.2	12.8
Air to Fuel Ratio	Calc	2.04	2.26	2.09	2.11	2.45	1.87	2.20
Pulv Inlet Temp	87.2	279.8	276.5	272.8	278.7	278.1	320.7	289.7
Pulv Outlet Temp	92.8	150.8	150.1	149.7	150.1	150.1	150.4	151.3
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	0.0
Air Bias	0.0	0.0	7.7	0.0	0.0	11.7	0.1	8.7
Hyd Skid Pr Fdbk	8.	2234.	2181.	1966.	2029.	4.	2175.	2239.
Hyd Skid Pr Setpt	1149.	2282.	2250.	2256.	2197.	2111.	2400.	2291.

EndTim= 29-Jul-04 16:44:33 /EvalTim= 29-Jul-04 16:44:33 /PanRate= 0

Printed out for: PHIL-H - 29-Jul-04 12:57:05 1 G B-Hd Rot. Throat

0 Messages U1 Pulv U1 Pulv Operating data 29-Jul-04 12:57:05



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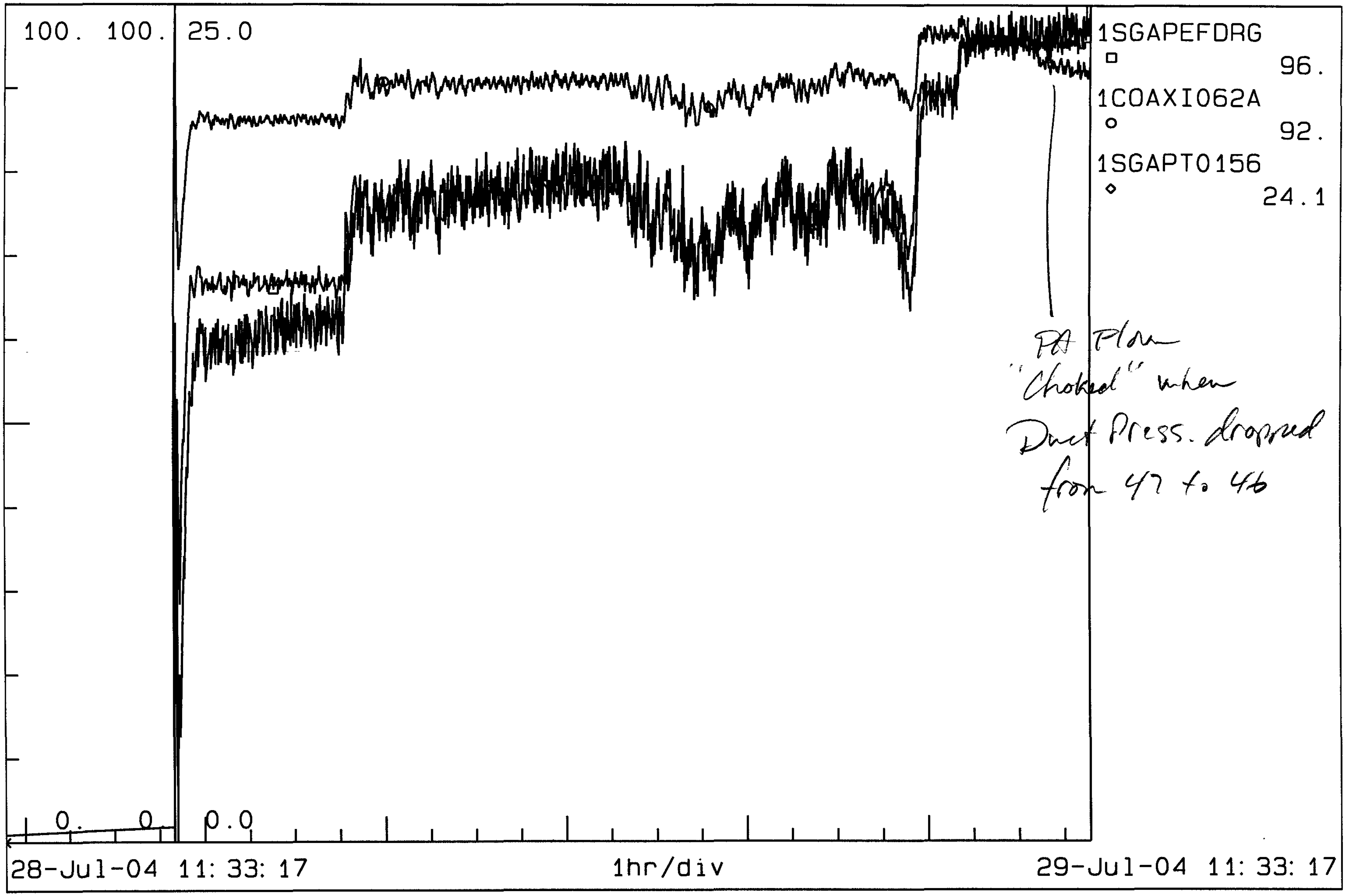
IP12_003059

Printed out for: PHIL-H - 29-Jul-04 11:33:26

0 Messages U1 Pulv U1 Pulv Operating data 29-Jul-04 11:33:26



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Printed out for: PHIL-H - 29-Jul-04 11:33:33 U1 G Below Throats

0 Messages U1 Pulv U1 Pulv Operating data 29-Jul-04 11:33:33

Unit 1 946.5 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow363.2TPH	BadI	49.8	48.9	50.0	48.4	46.5	64.6	51.2
Feeder Speed	Calc	74.5	73.8	72.1	72.3	67.5	95.7	76.3
Amps (Duct Pr46.2	0.0	68.9	66.4	67.7	62.2	47.7	53.9	64.9
Coal Pipe Vel	5.	3915.	4242.	3930.	3886.	4338.	4076.	4297.
PA Flow %	0.1	88.3	95.5	87.8	87.7	97.6	92.8	96.7
PA Damper Pos	0.0	75.3	73.0	66.3	75.2	80.1	100.	79.0
SA Damper Pos	35.0	66.2	69.5	66.2	66.2	64.8	91.2	66.9
PA Mass Flow	5.	3492.	3790.	3478.	3472.	3875.	3635.	3860.
Pulv DP (NOx 0.35	0.0	9.7	13.8	11.4	12.7	15.3	24.6	13.2
Air to Fuel Ratio	Calc	2.08	2.26	2.13	2.12	2.53	1.67	2.21
Pulv Inlet Temp	81.5	282.3	283.9	291.8	282.0	282.2	350.5	288.2
Pulv Outlet Temp	89.1	151.3	150.6	149.7	150.8	150.3	150.3	151.5
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	0.0
Air Bias	0.0	0.0	7.7	0.0	0.0	11.7	0.1	8.7
Hyd Skid Pr Fdbk	5.	2240.	2140.	1976.	1995.	4.	2105.	2219.
Hyd Skid Pr Setpt	1149.	2247.	2199.	2234.	2182.	2091.	2400.	2287.

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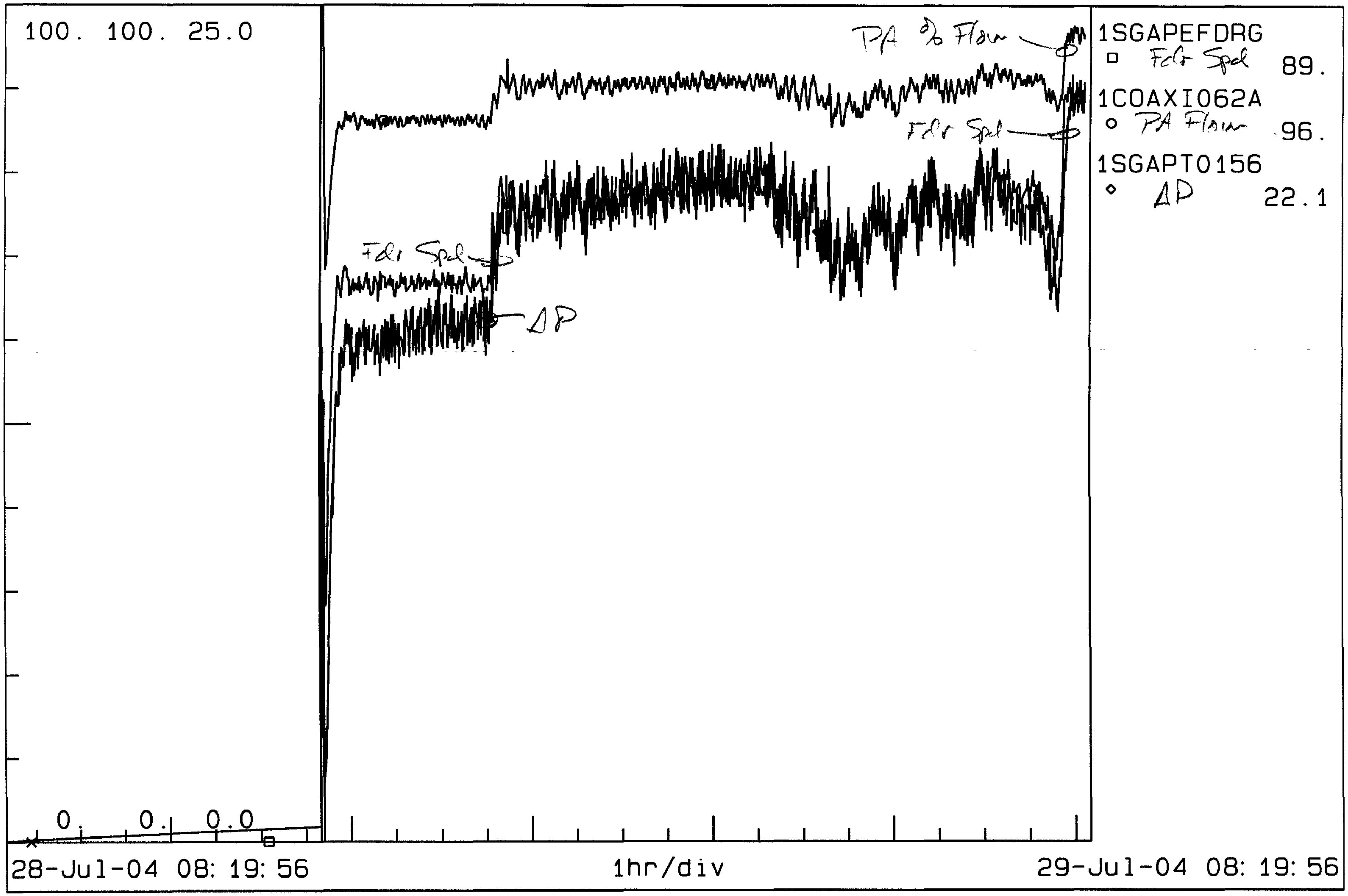
IP12_003061

1G Bowl Rot. Throats

Printed out for: PHIL-H - 29-Jul-04 08: 12: 16

0 Messages U1 Pulv U1 Pulv Operating data 29-Jul-04 08: 12: 16



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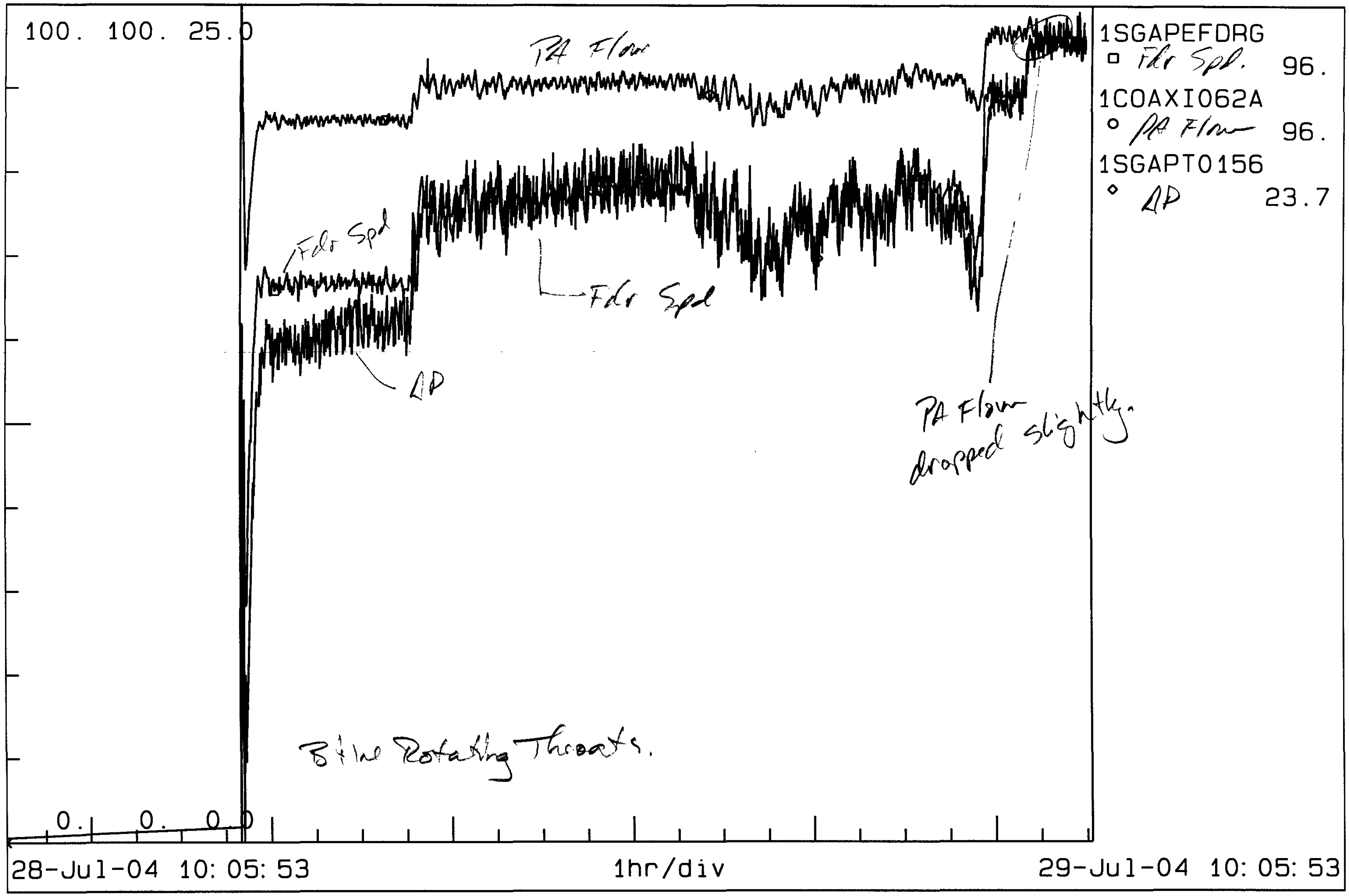
IP12_003062

Printed out for: PHIL-H - 29-Jul-04 09:57:33

Unit 1 B

0 Messages U1 Pulv U1 Pulv Operating data 29-Jul-04 09:57:33



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IP12_003063

Printed out for: PHIL-H - 29-Jul-04 10:04:40

16 B&W Ref. Throats

0 Messages U1 Pulv U1 Pulv Operating data 29-Jul-04 10:04:40

Unit 1 950.3MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow365.9TPH	BadI	51.3	51.6	51.9	50.4	48.2	64.7	52.9
Feeder Speed	Calc	77.7	75.4	76.0	73.6	70.5	95.7	78.3
Amps (Duct Pr46.6)	0.0	69.9	59.2	65.4	62.4	51.2	52.4	65.9
Coal Pipe Vel	4.	3956.	4259.	3942.	3935.	4369.	4252.	4349.
PA Flow %	0.1	88.6	95.2	88.5	88.2	98.1	94.8	97.3
PA Damper Pos	0.0	75.8	73.5	66.8	75.6	80.2	99.9	79.5
SA Damper Pos	35.0	68.8	72.5	69.3	69.0	67.5	91.7	69.6
PA Mass Flow	4.	3530.	3804.	3487.	3473.	3909.	3760.	3834.
Pulv DP (NOx 0.34)	0.0	10.1	12.7	11.4	13.3	14.9	24.2	14.0
Air to Fuel Ratio	Calc	2.00	2.23	2.03	2.08	2.44	1.73	2.16
Pulv Inlet Temp	79.2	285.2	293.2	302.8	289.9	289.1	347.7	291.9
Pulv Outlet Temp	86.1	151.4	150.1	149.7	149.7	150.1	150.4	150.6
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	0.0
Air Bias	0.0	0.0	7.7	0.0	0.0	11.7	0.1	8.7
Hyd Skid Pr Fdbk	2.	2225.	2181.	2049.	2007.	3.	2099.	2280.
Hyd Skid Pr Setpt	1149.	2287.	2297.	2302.	2234.	2169.	2400.	2345.

EndTim= 29-Jul-04 10:04:40 /EvalTim= 29-Jul-04 10:04:40 /PanRate= 0

IP12_003064

Printed out for: PHIL-H - 29-Jul-04 07:45:34

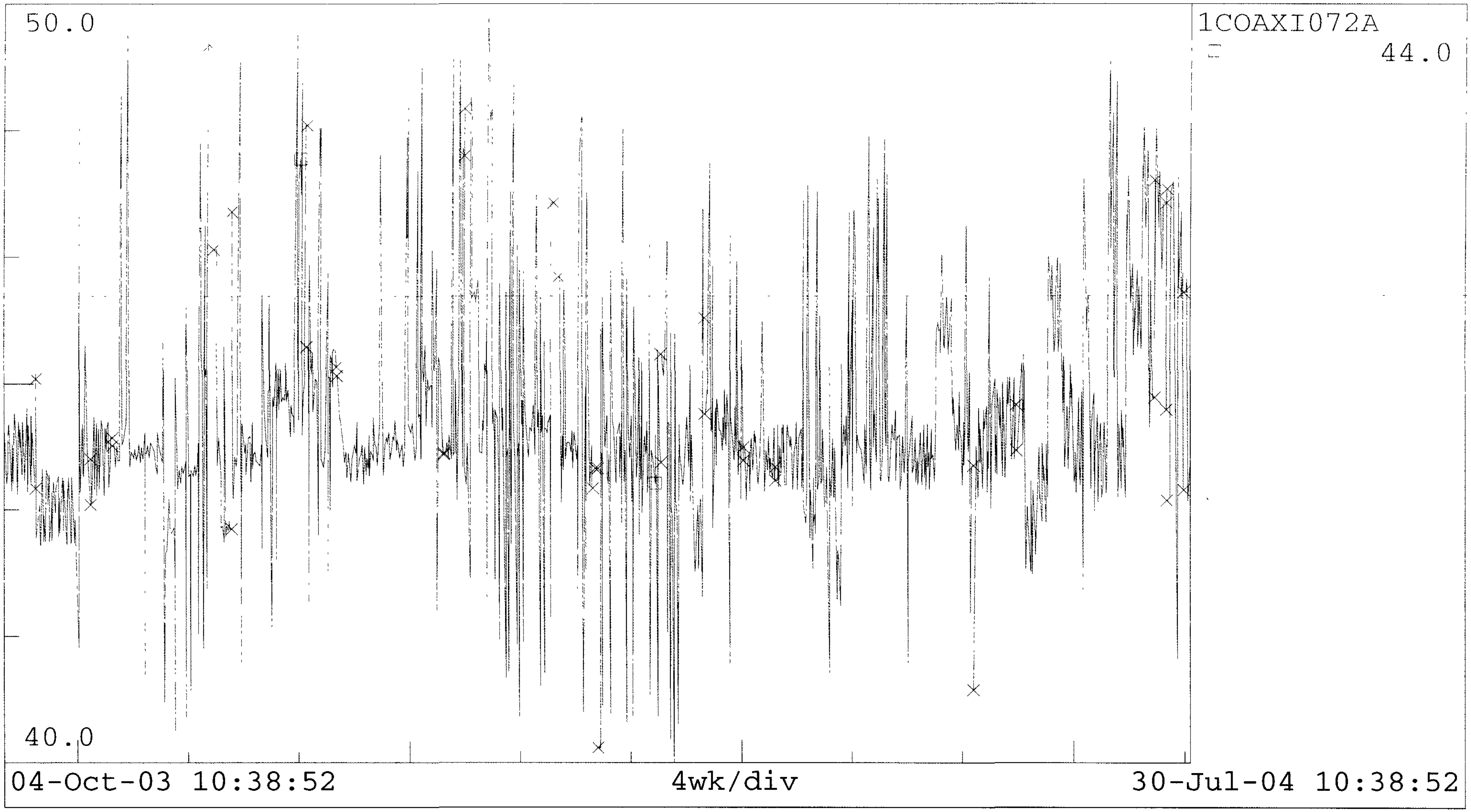
0 Messages U1 Pulv U1 Pulv Operating data 29-Jul-04 07:45:34

Unit 1 897.3 MW	Pulv A	Pulv B	Pulv C	Pulv D	Pulv E	Pulv F	Pulv G	Pulv H
Coal Flow353.4TPH	0.0	50.8	49.6	50.6	49.5	46.3	60.5	51.9
Feeder Speed	0.0	74.2	71.4	72.2	71.6	67.7	88.9	75.3
Amps (Duct Pr47.3)	0.0	63.7	60.2	62.5	63.7	47.4	48.2	65.4
Coal Pipe Vel	4.	3975.	4289.	3957.	3940.	4394.	4111.	4350.
PA Flow %	0.1	88.6	95.6	88.3	87.8	98.4	95.3	96.8
PA Damper Pos	0.0	74.9	73.0	66.0	74.9	79.4	82.7	78.9
SA Damper Pos	35.0	67.0	70.5	67.2	67.0	65.7	85.3	67.6
PA Mass Flow	4.	3549.	3768.	3484.	3469.	3894.	3741.	3840.
Pulv DP (NOx 0.32)	0.0	9.3	12.1	11.2	13.1	15.4	19.7	13.2
Air to Fuel Ratio Calc		2.11	2.37	2.16	2.17	2.56	1.83	2.28
Pulv Inlet Temp	76.2	285.2	300.1	307.8	286.6	299.1	320.5	293.5
Pulv Outlet Temp	84.8	150.6	149.4	149.7	148.9	149.7	149.4	149.4
Coal Bias	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	0.0
Air Bias	0.0	0.0	7.7	0.0	0.0	11.7	0.1	8.7
Hyd Skid Pr Fdbk	1.	2206.	2135.	1219.	1981.	3.	2091.	2286.
Hyd Skid Pr Setpt	1149.	2268.	2222.	2261.	2202.	2102.	2400.	2305.

EndTim= 29-Jul-04 07:45:34 /EvalTim= 29-Jul-04 07:45:34 /PanRate= 0

IP12_003065

Printed out for: PHIL-H - 30-Jul-04 10:34:21
0 Messages U1 Pulv U1 Pulv Operating data 30-Jul-04 10:34:21



EndTim= 30-Jul-04 10:34:21 /EvalTim= 30-Jul-04 10:34:21 /PanRate= 0

Dale
Allan
Mike Alley.
Stan

Joa F.
Richard Schmidt.
Dennis K.

Key Issues

Differential
Fineness
Power
PA Duct Pressure.
Ideas
Capacity / Throughput.
Reject

Maintenance issues better for Rotating.
Operations " " " Non-Rotating.

Rejects
- Better to have rejects... agreed to by all.
"No rejects" are bad.

"Operations" hates rotating throats.

Maintenance saves money... how much?
- Raising duct pressure
2X $1/2 Million/per Unit/per year for high speed fan operation.
- Extra crew for maintenance for stationary throats. per Dale.
• Determine total costs of throats.
+, - of each style.

OR = "Operational Reliability" worth the $ saved for Maintenance?

AF 2002 2003 2003

IP12_003067

Wear Problem.

- Non-rotation in the lower end. H mills with B&W. Some upper end wear.

- Upper-end wear remains a concern.

- % of Upper vs. Lower end wear.

- Jon F concerned of "O.R." hit with rotating ~~throats~~.

- Upsets (6-mill operation) more likely to occur with uprate. i.e. 85%-95% mill operation ~~may~~ will be more typical.

- 1/2 vs 1/2 in each unit.
  85%-95% operation with high differential. (25"-26") is a concern.
  "Status quo" of 1/2 & 1/2.
  - No Stationary changes
  - 2B (?) Upsize 10% bigger new throat.

* "Technomics" weldable, oversize throat still available?

"B&W earlier version is better" - James.
(Rotating H mill's)

- "Fineness" measurement is crucial because of NO_x & CO effect. Fineness positively effects both parameters.
- DP higher with rotating throats.

"20" on a nominal basis is a concern" - James

- Maintenance is in tough shape with regard to repairing stationary throats. Behind the 8-Ball.

What is the cross-sectional area?

- "Technomics" → contact them about throat status. Weldable, Oversize.

Jerry hates...

hybrid mode of operation -- one rotating throat may cause higher duct pressure.

Higher duct pressure ~~to~~ caused by the existence of only one throat.

"Eng. Fiduciary Responsibility"

Seems to be excess effort to make these things run.

"Fineness drops/dives everytime we open up the throats."

↳ Investigate all of the fineness numbers. How much have they changed or impacted us.

IP12_003069

- Find the BPE sketches of the TechWonders throats
- Determine the B&W cross-sectional area. What cross-sectional area seems to work best?
- Compare all of the throats areas.

Fineness

- Gary's data is rather dispersed over time. Too many parameters.

"O.R." from returning to stationary throats.

Recent derates for mills. When? Why?
Leads to concerns over the future viability of OR based mills.

TOPS 35500

IP12_003070

- Scaffolding
- Burner-Stabilizer → Maintenance
- Burner linkages for Old burners. → Maintenance

- "Steam spacer"
- Blue Ram around soot blower
- Traded hand-cuffs for Sootblower/Tube Shields work.

GRO Tech is part of base contract.

Review Costs

1) Review for Maintenance costs
2) Review for excess hours from each time sheet.
3) " " mis-billing

Max tons/hour/unit	360
Min tons/hour/unit	320
Units online	7
Tons of Rock/hour/mill	5.7
Pounds of Rock/hour/mill	190.5

The Costs of Rock

Past & Future Operating Costs

Summary

Average Annual Costs of Rock		**$1,769,555**
Operating Costs for Past	5 Year(s)	**$6,388,518**
Operating Costs for Future	5 Year(s)	**$11,307,036**
Total Past & Future Costs (PV)		**$17,695,555**

Input Number of Years to Look Back	5
Input Number of Years to Project Forward	5
Input Cost of Capital (%)	0

Cost Breakdown

Past & Future Operating Costs

			Operating Costs for Past 5 Year(s)	Operating Costs for Next 5 Year(s)
Operations				
1 additional operator 24-7 to assist with pulling rejects. This requires 4 men to support a 24-7 schedule				
	Costs per Man	$68,750		
	Men Required	4		
	Per Unit Costs	$275,000		
		x2 Units		
		$550,000	$2,750,000	$2,750,000
Maintenance				
This year, Maintenance will be adding a night shift specifically dedicated to rebuilding the mills. This is attributed to rock and iron entering the mill with the coal The size of the crew will be 10 mechanics and 1 supervisor for a period of 5 months It is anticipated that this would last for 5 months, and be a yearly expense The costs are listed below				
	Labor	$470,000		
	Parts	$500,000		
		$970,000		$4,850,000
Estimating that 30% of the pulverizer mill maintenance budget is attributed to wear associated with rock The present budget is $880,000 for parts, and $1,500,000 for labor.				
	Labor	$1,500,000		
	Parts	$880,000		
		$2,380,000		
	Est 30%	30%		
		$714,000	$3,570,000	$3,570,000

MEMORANDUM

INTERMOUNTAIN POWER SERVICE CORPORATION

TO: George W. Cross

FROM: Dennis K. Killian

DATE: October 21, 2002

SUBJECT: Estimated Costs of Increased Rejects in Coal

A study to determine the cost of increased rejects in the coal has been conducted. The study specifically looked at the past costs incurred due to an increased amount of rock and metal in the coal being received from the mines.

The cost of increased rock in the coal, over the past 5 years, is estimated at $4M.

The items reviewed to determine this cost were:

1) Costs to the Operations Department for reject system operation ($550,000/yr).
2) Costs to the Maintenance Department for mill repair ($238,000/yr).
3) Cost of unit derates associated with a high quantity of rejects ($65,778/7 incidences).

The total cost break down is as follows:

Cost to Operations	$ 2,750,000
Cost to Maintenance	$ 1,190,000
Cost of Derates	$ 65,778
Total Costs	$4,005,778

Unit Derate Costs

Costs of derates relating to poor coal quality.
Unit 1 has recorded 3 derates and Unit 2 has recorded 4 derates
The cost of 1 MWhr is $25.

Unit 1 MWhr Lost	$/MWhr	Derate Costs
298 8	$25	$7,470
24.9	$25	$623
664	$25	$16,600
987 7		$24,693

Unit 2 MWhr Lost		
298.8	$25	$7,470
107.9	$25	$2,698
763.6	$25	$19,090
473.1	$25	$11,828
1643		$41,085

The average annual costs of derates associated with rock will be calculated based on the above information. This average will be used to project future derate costs attributable to rock. The period of time is from 12/97 to 10/02 (4.8 years). Because of general doubling of mill repair rates and costs, it will be assumed that derates will likewise double due to increased frequency at 6-mill and consequently 5-mill operation.

Total Derate Costs		
	Unit 1	$24,693
	Unit 2	$41,085
		$65,778
Average Derate Cost Per Year		
	Costs	$65,778
	Years	4.8
	Costs/Yr	$13,704
Assume A Doubling of Future Derates		x2
		$27,407

$68,518

$137,036

$6,388,518

$11,307,036

IP12_003075

UNIT	Outage TYPE	OUTAGE PERIOD	Cause CODE	OUTAGE CAUSE DESCRIPTION	Equiv. Hrs	MW Lost
IGS2	D1	01/22/89-01/22/89	3619	ICS POLE TRIP - CONVERTER STATION RUNBACK.	0.81	672.3
IGS2	D1	05/07/89-05/07/89	1480	ID FAN SUPPLY BREAKERS 1A2 & 1B2 TRIPPED DUE TO HI TEMP IN FAN INVERTER ROOM.	0.17	141.1
IGS2	D1	06/25/89-06/25/89	3499	B HEATER STRING O/S TO REPAIR LEAKING VALVE.	0.03	24.9
IGS2	D1	07/10/89-07/10/89	3619	ICS POLE 1 TRIP RESULTING IN CONVERTER STATION RUNBACK.	2.08	1726.4
IGS2	D1	11/18/89-11/18/89	3659	METALLIC RETURN LOST WHEN ADELANTO OPENED 2H INTERRUPTING CURRENT ON METALLIC RETURN.	2 10	1743
IGS2	D1	11/21/89-11/21/89	4309	FAILURE OF MW CONTROLLER OUTPUT MODULE.	0 53	439.9
IGS2	D1	01/31/90-01/31/90	3659	ICS POLE 2 TRIP - FLASHOVER DC LINE CAPACITOR CAN REPLACED DUE TO INSULATOR DESTROYED	2 00	1660
IGS2	D1	03/15/90-03/15/90	3600	TRANSFORMER TROUBLE AT ADELANTO REPAIR OIL LEAK	1.51	1253.3
IGS2	D1	05/10/90-05/10/90	1710	CO>1% DUE TO BLR MASTER BACKING OUT TOTAL AIR WHEN COAL PADDLE SWITCH FAILED.	0.07	58.1
IGS2	D1	06/29/90-06/29/90	3410	1B BFPT TRIP RESET SOLENOID FAILURE	0 77	639.1
IGS2	D1	08/15/90-08/16/90	3529	HP HTR 8B O/S - EXTRACTION MBV-2 FAILURE	1.00	830
IGS2	D1	08/24/90-08/25/90	1400	FD FAN 1A HYDRAULIC CONTROL PROBLEM	2.13	1767.9
IGS2	D1	12/28/90-12/29/90	3659	POLE 2 BLOCKED DUE TO ADELANTO A PHASE TRANSFORMER TRIP	1.69	1402.7
IGS2	D1	01/24/91-01/24/91	3659	POLE 2 STOPPED TO INSPECT OIL LEAK ON CONVERTER TRANSFORMER AT ADELANTO.	0.90	747
IGS2	D1	02/08/91-02/08/91	3659	BOILER RUNBACK DUE TO POLE 2 TRIPPING DUE TO A LINE FAULT.	0 16	132.8
IGS2	D1	02/08/91-02/08/91	3659	LINE FAULTS ON THE DC LINES, OUTPUT VOLTAGE SET A 70%	6 73	5585.9
IGS2	D1	04/20/91-04/20/91	1400	FD FAN 1B MODICON CARD FAILURE	0 05	41.5
IGS2	D1	12/25/91-12/25/91	3121	C CONDENSER HIGH BACKPRESSURE - AIR IN-LEAKAGE AT EXPANSION JOINT.	0.70	581
IGS2	D1	04/14/92-04/14/92	1700	FW HIGH RANGE FLOW TRANSMITTER FAILED CAUSING DRUM UPSET	0.06	49.8
IGS2	D1	05/03/92-05/03/92	3659	POLE 2 TRIP DUE TO HIGH GAS INDICATION ON ACS CONVERTER XFMR.	3 37	2797.1
IGS2	D1	05/18/92-05/18/92	1410	FD FAN A MOTOR CONNECTION FAILED CAUSING A GRND FAULT RELAY TRIPPING B CWP & A CT FAN.	0 63	522.9
IGS2	D1	07/21/92-07/21/92	3659	POLE 2 BLOCKED FINE WATER HEAT EXCHANGER PROBLEM	0 23	190.9
IGS2	D1	12/08/92-12/08/92	250	F PULV TRIP DUE BURNER TEMP IND, B&E FDRS TRIPPED. UNABLE INSERT LTRS DUE TO LOGIC. PULV TRI	0 26	215.8
IGS2	D1	01/28/93-01/28/93	3320	AIR IN-LEAKAGE INTO CONDENSER WHILE WORKING ON C CONDENSATE PUMP.	0 40	332
IGS2	D1	04/22/93-04/22/93	1480	LOSS ID FAN LINKS C1, D1 & D2 DUE TO LOSS HVAC SYSTEM IN ELECTRICAL ROOM.	0.04	33.2
IGS2	D1	06/16/93-06/16/93	3659	POLE 2 BLOCKED SHEDDING LOAD DUE TO FINE WATER PROBLEMS AT ADELANTO	0.66	547.8
IGS2	D1	08/31/93-08/31/93	340	FIVE PULV OPERATION FOLLOWING G PULV EMERGENCY TRIP.	0.02	16.6
IGS2	D1	09/08/93-09/08/93	335	FIVE PULV OPERATION FOLLOWING LOSS F PULV LUBE OIL PUMP.	0.09	74.7
IGS2	D1	09/23/93-09/23/93	250	FIVE PULV OPERATION FOLLOWING A FEEDER PROBLEM	0 02	16.6
IGS2	D1	01/18/94-01/18/94	3110	CONDENSER TUBE LEAK IN CONDENSER A INSIDE PASS	3.35	2780.5
IGS2	D1	02/23/94-02/23/94	340	FIVE PULV OPERATION FOLLOWING H PULV EMERGENCY TRIP	0 04	33.2
IGS2	D1	03/22/94-03/22/94	3619	ICS POLE 2 TRIP. BROKEN LINE ON CONV XFMR BUSHING DURING HIGH WINDS.	0 85	705.5
IGS2	D1	06/30/94-06/30/94	250	G FEEDER PADDLE SWITCH REPLACEMENT 5 PULV OPERATION	0.15	124.5
IGS2	D1	11/21/94-11/21/94	340	5 PULV OPERATION AFTER B PULV TRIP	0 06	49.8
IGS2	D1	12/18/94-12/19/94	3659	POLE 2 BLOCKED CONVERTER TRANSFORMER PROBLEMS AT ADELANTO	2 67	2216.1
IGS2	D1	01/15/95-01/20/95	3659	ICS POLE #2 DC CURRENT TRANSDUCER CATASTROPHIC FAILURE.	19 25	15977.5
IGS2	D1	03/01/95-03/01/95	310	FIVE PULV OPERATION LOAD DROP FOR STABILITY.	0.71	589.3
IGS2	D1	03/27/95-03/27/95	3659	POLE 2 TRIP WHILE POLE 1 O/S	0 16	132.8
IGS2	D1	03/27/95-03/27/95	3659	POLE 2 O/S FOLLOWING TRIP. POLE 1 I/S	3 11	2581.3
IGS2	D1	05/07/95-05/07/95	3659	BI-POLE BLOCK LOSS FINE WATER FLOW	0.71	589.3
IGS2	D1	10/01/95-10/01/95	260	PA FAN 2B PMCS. CPU BOARD FAILURE	0.32	265.6
IGS2	D1	10/17/95-10/17/95	310	PULV PROBLEMS WHILE IN SIX MILL OPERATION.	0 01	8.3
IGS2	D1	01/20/96-01/20/96	260	A PA FAN TRIPPED DUE TO MODICON FAILURE.	0.22	182.6
IGS2	D1	01/21/96-01/21/96	310	6 PULV OPERATION F O/S REBUILD & B PULV DAMPER PROBLEMS.	0.09	74.7
IGS2	D1	02/06/96-02/06/96	3659	POLE 1 TRIPPED INSULATOR FLASHOVER	0 26	215.8
IGS2	D1	02/06/96-02/06/96	3659	BOTH ICS POLES O/S TILL 10 11 REDUCED VOLTAGE ON POLE 1.	4.55	3776.5
IGS2	D1	07/02/96-07/02/96	9300	LOSS PACIFIC AC INTERTIE LINE	0.08	66.4
IGS2	D1	08/10/96-08/10/96	9300	PULV STARTUP PROBLEMS FOLLOWING MILLS BEING TRIPPED FOR PRESS EXCURSION BY GRID UPSET	0.36	298.8
IGS2	D1	09/19/96-09/19/96	338	A&B PULV TRIPPED ON FALSE LOW PA FLOW INDICATION.	0 14	116.2
IGS2	D1	12/10/96-12/10/96	3659	ECC LOST MICROWAVE COMMUNICATIONS LOAD REDUCED DUE TO CONTINGENCY ARMING CONCERNS.	1 41	1170.3
IGS2	D1	01/16/97-01/16/97	30	COAL FUEL SUPPLY TO UNITS CONVEYOR 18B O/S& FREEZING TEMPS BOTH CONTRIBUTORS	1.96	1626.8
IGS2	D1	06/17/97-06/17/97	4261	#3 CV SERVO REPLACEMENT FOLLOWING FAILURE	0.17	141.1
IGS2	D1	07/14/97-07/14/97	290	6 MILL OPERATION WITH H O/S MAINT, E PULV BROKEN LOADING RODS	0.14	116.2
IGS2	D1	09/20/97-09/20/97	340	F & G PULV EMERGENCY TRIPPED DUT TO BAD INPUT MODULE.	0 30	249
IGS2	D1	09/27/97-09/28/97	340	6 PULV OPERATION - B PULV TRIPPED AND A O/S FDR CALIBRATION.	0 12	99.6
IGS2	D1	12/02/97-12/02/97	9290	LOAD LIMIT DUE TO POOR QUALITY COAL.	0.36	298.8
IGS2	D1	12/20/97-12/20/97	3634	2A SUMP PUMP GROUNDED CAUSING 2A04 MAIN BRKR TO TRIP	0 41	340.3
IGS2	D1	04/24/98-04/24/98	340	E1 BURNER COAL PIPE FIRE. MILL TRIPPED. 6 PULV OPERATION	0.08	66.4
IGS2	D1	07/01/98-07/01/98	855	REDUCED DRUM PRESS DUE TO DRUM SAFETY CONCERNS.	0.33	273.9
IGS2	D1	07/01/98-07/01/98	855	LOAD LIMIT TO HYDROSET DRUM SAFETIES	1 16	962.8
IGS2	D1	07/02/98-07/02/98	9290	LOAD LIMIT DUE TO ROCK IN COAL FOR STABILITY WHILE TAKING 2A PAN FAN TO HIGH SPEED	0.13	107.9
IGS2	D1	09/02/98-09/02/98	1488	SAH 1B COUPLING/MOTOR FAILURE.	0 26	215.8
IGS2	D1	09/04/98-09/07/98	3503	HP FW HTR 8A ALTERNATE DRAIN LINE FAILURE.	2.24	1859.2
IGS2	D1	10/08/98-10/08/98	3639	B4 SUS TRIPPED ON HIGH TEMP TRIPPING E, G &H PULV RUNBACK TO 600 MWG	0.25	207.5
IGS2	D1	12/14/98-12/14/98	3415	A BFPT O/S FOR LEAKING PRESSURE SWITCH REPLACEMENT	0.08	66.4
IGS2	D1	01/21/99-01/21/99	335	E PULV TRIP ON LOSS LUBE OIL PUMP	0.09	74.7
IGS2	D1	06/13/99-06/13/99	3659	ADELANTO POLE 2 B-PHASE MAIN TRANSFORMER PROBLEM	0 69	572.7
IGS2	D1	08/02/99-08/02/99	1415	B FD FAN PMCS TRIP CPU BOARD REPLACED	0 10	83
IGS2	D1	09/29/99-09/29/99	1415	B FD FAN PMCS TRIP CPU BOARD REPLACED	0 08	66 4

IGS2	D1	10/19/99-10/21/99	920	ID FAN TRIP LOAD LOWERED DUE TO BOTTOM ASH PROBLEMS	1 30	1079
IGS2	D1	02/16/00-02/16/00	3659	POLE #2 BLOCK. CONVERTER STATION AT ADELANTO FLASHOVER	0 39	323.7
IGS2	D1	09/12/00-09/12/00	8499	D SCRUBBER MODULE TRIP. MODICON GROUND PROBLEM	0.06	49.8
IGS2	D1	09/13/00-09/13/00	8650	A BAGHOUSE CASING TRIP ON PC CPU FAILURE.	0.36	298.8
IGS2	D1	10/29/00-10/30/00	1410	B FD FAN TRIP FD FAN MOTOR A-PHASE GROUNDED.	0.23	190.9
IGS2	D1	11/26/00-11/27/00	1488	1A SAH BURNED UP CLUTCH ON START-UP AIR DRIVE.	2.32	1925.6
IGS2	D1	01/10/01-01/11/01	3659	POLE 2 BLOCK DUE TO FLASHOVER AT ADELANTO.	0 44	365.2
IGS2	D1	01/11/01-01/11/01	3659	POLE 2 BLOCK. POLE & CONVERTER DC CONVERTER DIFFERENTIAL	0 62	514.6
IGS2	D1	04/07/01-04/07/01	250	5 PULV OPERATION, A O/S MAINT, F FDR BEARING REPLACEMENT, H FDR SPEED PROBLEM	0 17	141.1
IGS2	D1	05/15/01-05/16/01	9290	PULV LOADING UP DUE TO BAD COAL. PA FAN IV'S 100%. 2B PA FAN TO HI SPD WHICH TRIPPED.	0.92	763.6
IGS2	D1	05/16/01-05/16/01	9290	PULV REJECTS PROBLEM. PULV TRIPS ON B & G LOW AIR FLOW DUE TO EXCESSIVE PYRITES.	0.57	473.1
IGS2	D1	06/16/01-06/16/01	3659	POLE 1 BLOCK DUE TO POWER CONTROL GLITCH. POLE 2 METALLIC RETURN PROBLEM.	1 45	1203.5
IGS2	D1	06/24/01-06/24/01	310	B & D PULV O/S INSPECTIONS. C MILL TRIPPED AND G FEEDER LOST SIGNAL.	0.22	182.6
IGS2	D1	09/07/01-09/07/01	250	B & G FEEDER/PULV TRIPPED 5 PULV OPERATION	0.08	66.4
IGS2	D1	09/10/01-09/10/01	260	PA FAN 2B PMCS REPLACED REMOTE I/O J-540	0.20	166
IGS2	D1	09/15/01-09/15/01	260	PA FAN 2B PMCS. REPLACED REMOTE I/O J-540	0.21	174.3
IGS2	D1	09/17/01-09/17/01	260	PA FAN 2B PMCS REPLACED 421 POWER SUPPLY	0.34	282.2
IGS2	D1	10/20/01-10/20/01	1488	1B SAH ROTOR STOPPAGE. NEW FLUID COUPLING INSTALLED	0 13	107.9
IGS2	D1	11/24/01-11/25/01	3659	POLE 1 BLOCK. ADELANTO TRANSFORMER C PHASE Y BUSHING BROKEN CONDUCTOR	3.63	3012.9
IGS2	D1	12/01/01-12/01/01	3412	B BFPT TRIP DURING WEEKLY OVERSPEED TESTING BAD POSITION LOGIC BOARD.	0 39	323.7
IGS2	D1	12/01/01-12/01/01	3412	B BFPT TRIP DURING SUS TESTING. SOLID GROUND ON UNIT BATTERY BUS REPAIRED.	1.59	1319.7
IGS2	D1	12/28/01-12/28/01	250	5 PULV OPERATION A PULV & G FDR PROBLEMS WITH C PULV O/S MAINTENANCE.	0.09	74.7
IGS2	D1	04/20/02-04/20/02	3659	POLE 2 BLOCKED HOT SPOT REPAIR LINE DROP CONNECTION TRANSFORMER B PHASE X1 Y BUSHING.	3 03	2590.65
IGS2	D1	08/05/02-08/05/02	3659	POLE 2 Y BUSHING B PHASE CONNECTOR PROBLEM	0.61	521.55

Pulverizer Coal Flow and Run Time

	OCT 8, 2002 Meter Reading	OCT 1, 2001 Meter Reading	Tons (Difference)	Run Hours	Tons/Run Hour	Days Ran
1A	954488	565000	389488	8098	48.10	337
1B	920269	536030	384239	7956	48.30	332
ROT	696892	460476	236416	4964	47.63	207
1D	940185	533803	**406382**	**8283**	**49.06**	**345**
1E	917337	548121	369216	**8174**	**45.17**	**341**
1F	932817	551801	381016	7900	48.23	329
ROT	956177	619855	336322	7025	47.88	293
ROT	927961	571866	356095	7408	48.07	309
2A	901473	526859	374614	7880	47.54	328
2B	903996	543106	360890	7501	48.11	313
2C	854553	544290	310263	6521	47.58	272
ROT	886421	528351	358070	7459	48.01	311
2E	899877	559134	340743	7143	47.70	298
2F	904051	557145	346906	7360	47.13	307
2G	850144	517725	332419	6949	47.84	290
ROT	837728	569899	**267829**	**5907**	**45.34**	**246**
Averages			346932	7283	47.60	303.6
Median			357083	7434	47.86	310.0
Stand Dev			44528	887	1.01	36.9
+1Sigma			391460	8170	48.61	340.5
-1 Sigma			302403	6396	46.60	266.7

Pulverizer Tons/Run Hour

	Tons/Run Hour	
1D	49.06	+1 Sigma 48.61
1B	48.30	
1F	48.23	
2B	48.11	
1A	48.10	
1H	48.07	
2D	48.01	
1G	47.88	Median 47.86
2G	47.84	
2E	47.70	
1C	47.63	Ave 47.60
2C	47.58	
2A	47.54	
2F	47.13	-1 Sigma 46.60
2H	45.34	
1E	45.17	
Averages		47.60
Median		47.86
Stand Dev		1.01
+1Sigma		48.61
-1 Sigma		46.60

<u>Explanatory Notes:</u>
ROT = Rotating Throats are Installed.
Yellow highlight shows mill data for rotating throats.
Bold Face data are outside +/- 1 standard deviation.

Phil Hailes
10/7/2004 10:09 AM

Data compiled between October 1, 2001 and October 8, 2002.
"Meter Reading" is accumulated tons of coal per PI (Archive Data List)
"Tons (Difference)" is total tons (the mathematical difference between the two meter readings).
"Run Hours" is accumulated actual run time for each mill (i.e. down-time is excluded) per PI.
"Tons/Run Hour" is "Tons (Difference)" divided by "Run Hours".
"Days Ran" is actual number of days that the mill was running.

Dennis
James

September 14, 2004

Estimated Pulverizer Maintenance Cost Difference – Stationary vs. Rotating Throats

I. Parts

A. Throats and Ledge Covers

Upper stationary throats and ledge covers must be replaced every year. The difference in cost between stationary and rotating throats is estimated as:
$25,000/set X 16 mills/year = +$400,000/year for stationary throats.

There is an additional cost over the next four years to stay with, and go back to stationary throats, on all the mills, if this is the direction that is chosen. All of the mills will need new lower throats installed as soon as possible. The cost of installation and reinstallation of lower stationary throats is estimated as:
$125,000/set X 4 mills/year = +$500,000/year for stationary throats.

B. Overhaul Parts

Overhauls are ideally scheduled every 30,000 hours. However, because of upper stationary throat and ledge cover replacements every year, overhauls are done in conjunction with the throat and ledge cover change outs on stationary throat mills. Maintenance has found that we lose about six months to one year (or about 1/4) of the wear on tires, bowl segments, ceramics, pivot pins, wear plates, and wheel guards, as compared to what we can do with rotating throats. The difference in cost between stationary and rotating throats is estimated as:
$55,000/mill X 16 mills X 1/4 = +$220,000/year for stationary throats.

C. Erosion Resistant Parts

High PA duct pressure and pulverizer D/P's have increased erosion in the mills. Tungsten carbide plate has been welded in these mills and appears to be able to last for years (though our experience is still limited). Assuming 2 sheets of plate added to the rotating throat mills at every overhaul, the difference in cost between stationary and rotating throats is estimated as:
$2,500/sheet X 2 sheets X 4 overhauls/year = –$80,000/year for rotating throats.

II. Labor

A. Stationary Throats

Upper throats and ledge covers must be changed every year. This requires raising the frame, removing the wheels, changing out the upper throats and ledge covers, repairing any damage in the mill, and then putting each of the mills back together. During the throat and ledge cover change outs, five mills must also receive a complete overhaul each year (six mills every third year). Based on our history without using overtime, the time to replace throats and ledge covers will take about 2 – 3 weeks for each mill, and an overhaul will take about 8 – 10 weeks. Coupled with the normal 3,000 hour inspections, Maintenance will need to do at least 4 mills during outages using contractor labor, and one day of overtime per week will be required during the year to keep up with the work load, which includes unscheduled, breakdown and emergency work.

B. Rotating Throats

With rotating throats, overhauls are scheduled based on mill parts condition and usually not the throats. Four mills would receive a complete overhaul each year (no contractor labor needed), and the normal 3,000 hour and 6,000 hour inspections/repairs could be done with existing manpower on regular shifts to keep up with the load. No labor costs in added shifts, overtime, or for contractors are anticipated.

C. Labor Cost Difference for Stationary Throats

The difference in labor costs between stationary and rotating throats is estimated as:

Contractor Labor During Outages:
$70,000/mill X 4 mills = +$280,000/year.

Overtime (5/10's for the year):
$32/hour X 1.5 X 10 hours X 12 employees X 52 = +$300,000/year.

III. Stationary Throat Maintenance Total Cost Difference Per Year

$400,000
+500,000
+220,000
− 80,000
+280,000
+300,000
+$1,620,000/year

MEMORANDUM

INTERMOUNTAIN POWER SERVICE CORPORATION

TO: George Cross

FROM: Dennis Killian

DATE: October 11, 2004

SUBJECT: Status of Rotating and Stationary Throats

Recommendations

1) Install one set of B&W Reverse Rotation(B&W RR)large port throats and conduct performance tests.

2) Install the B&W RR large port throat in the next available rotating throat mill rather than altering another stationary throat mill, if possible.

3) After completion of the B&W RR large throat test, a determination for future use should be made between the large or medium port rotating throat design.

Summary Statements of Present Status

1) The B&W RR throat is capable of maintaining 90% feeder speed, 90% PA flow at 44" wc. These parameters are required during 6-mill operation and unit generation of 950 MW. This has occurred with a 50/50 split of rotating and stationary throats in operation.

2) The B&W RR throat is the most viable option for rotating throat use at this point. This is taking into consideration: cost, performance, vendor viability and support, difficulty of installation, maintenance and a mandate to stop testing and make-a-decision.

3) Neither rotating throat nor stationary throat mills consistently pass the established performance criteria for rotating throat acceptance.

4) Of the 16 pulverizers, 8 have stationary throats and 8 have rotating throats. These are distributed evenly between the units, with each unit having 4 of each kind.

5) The 8 rotating throats on site consist of 4 designs from 3 manufacturers. The 8 throats are: (3) B&W RR medium port, (2) B&W old style, (1) BPI and (2) Techinomics.

6) The B&W RR medium throat mills, do not have rejects. The consequence of this, is expected to be upper-mill wear. There exists an unresolved trade-off between rejects for an operator, or potential upper-mill wear for maintenance.

7) At the present time, the decision is between use of B&W RR medium port or a yet-to-be-installed B&W RR large port. Area of the large port throats is 10% greater than the area of the medium port throats.

8) PA Duct pressure has been has been >44" wc for an extended period and prior to installation of the B&W RR throats. All rotating throat tests were required to be conducted at 42" wc.

Discussion of Recommendations

Recommendation 1)

Install one set of B&W Reverse Rotation(B&W RR)large port throats and conduct performance tests.

Instant transition to either rotating or stationary throats is not possible, whether there is a mandate or not; consequently, there exists an opportunity to confirm the performance of the yet-to-be installed large port B&W RR throat.

This large port throat has already been ordered. The past 3 B&W RR throats have medium sized ports. The new B&W RR large throat should be installed into the next available rotating throat mill, if possible. This will bring IPP closer to having a fleet of mills with consistent rotating throat products.

Commitment to full use of stationary throats is apparent, but the decision as to which throat is best should be made after testing of the B&W RR large port is complete.

Recommendation 2)

> *Install the B&W RR large port throat in the next available rotating throat mill rather than altering another stationary throat mill, if possible.*

This is a conservative recommendation and a concession to caution. It would be preferable at this time, to eliminate some of the rotating throats that IPSC is no longer considering for future use. Consequently, this would mean purchasing stationary throat hardware for the upcoming Unit 1 F mill overhaul.

Ideally, maintaining the status quo by not altering the balance of 8 stationary and 8 rotating throats, as agreed upon, would be preferred. However, with the recommendation of installing a B&W RR large port throat and the immediate need to install new throats into Unit 1 F (stationary throats)as issues, it would be practical to save the $30,000 to $50,000 of purchase and installation costs by installing the B&W RR large port into the F mill rather than stationary throats.

Recommendation 3)

> *After completion of the B&W RR large throat test, a determination between the large and medium port design will be made.*

It is expected that the large port throat will reduce DP and improve PA flow at 90% and 95% feeder speeds. It will also reduce throat velocities, thereby allowing rejects to be removed from the mill. At this point, rejects are minimal in the B&W RR medium throats, and are expected to cause upper-mill wear during operation. If rejects are allowed to occur by reducing velocities, less upper-mill wear may result. The effect of larger port openings on coal fineness will also be determined.

Should a B&W RR medium throat be installed into any mill, and it is later determined that a larger size port is best, alterations could be made. With some preparation, the medium throats vanes could be trimmed by Maintenance to facilitate a 10% increase in port size. Ideally however, a properly sized throat would be purchased.

Discussion of Present Status

A meeting was held with most of the key individuals concerned about pulverizer mill components. This meeting was principally driven by the use of the newest style B&W RR medium port throats which have recently been installed. In the end, the decision was made that the then-present mill configurations would remain status quo. That is to say, stationary throat mills would only be replaced with stationary hardware and not be replaced with rotating throats; and all rotating throat mills would be fitted with rotating throat hardware as needed and not returned to a stationary throat configuration. This was an interim compromise, that is not fully satisfactory to everybody.

Commitment to one style of throat or the other (i.e. stationary vs rotating)can not practically be implemented immediately; time will be required to fully transition to either style, without regard to which style is selected. Consequently, time exists to determine if the soon-to-be installed large ported B&W RR throat will be adequate. To date, the 3 B&W RR throats that have been installed, medium sized ports only.

The various versions and the location of the installations are as follows:

Unit 1

A Mill:	Stationary
B Mill:	Stationary
C Mill:	Techinomics
D Mill:	Stationary
E Mill:	BPI
F Mill:	Stationary
G Mill:	**B&W Reverse Rotation (CCW), New Style, Medium Port.**
H Mill:	B&W Clockwise Rotation, Old Style.

Unit 2

A Mill:	Stationary
B Mill:	**B&W Reverse Rotation (CCW), New Style, Medium Port.**
C Mill:	Stationary
D Mill:	Techinomics
E Mill:	**B&W Reverse Rotation (CCW), New Style, Medium Port.**
F Mill:	Stationary
G Mill:	Stationary
H Mill:	B&W Clockwise, Old Style.

Performance Tests and Criteria

All rotating throats designs have been tested, after installation, against certain performance criteria established by Engineering. All rotating throat designs were determined to have not met the performance criteria. The principal criteria that was not met, with regard to performance, has been the inability to maintain 95% PA flow and low DP at 95% feeder speed, with duct pressure at 42" wc. (Additionally, some throat designs also have not been acceptable for reasons other than performance such as mechanical loosening, mill wear, installation difficulty, etc.)

Failure of all rotating throat designs to meet the criteria, when such throats are being used at other plants, leads to questions as to whether the criteria used to "fail" the rotating throats is reasonable. Would the existing stationary throats meet the performance criteria? A recent test showed that 3 of 4 stationary throats mill could not meet the criteria. Interestingly, the one stationary throat performed very well, was due for a major overhaul (Unit 2 A)with throats to be removed for wear. Another, performed poorly, though a major overhaul with new hardware, had just been completed (Unit 1 D).

The B&W RR medium port throat is able to maintain 90% feeder speed, without loading-up during 6-mill operation for extended periods beyond at least 12 hours. This is not to say that this throat is the absolute best performer with regard to rotating throat performance. At this point, we do not intend on reconsidering and retesting all of the past rotating throat designs to some newly established criteria.

All manufacturers, when informed of the failed test, claimed that had IPSC raised duct pressure above 42" wc, their throat would have passed the performance tests. This is also true of the B&W RR throat. PA Duct pressure has been >44" wc for an extended period and prior to installation of the B&W RR throats. All rotating throat tests were required to be conducted at 42" wc.

With a combination and consideration of all of the factors involved with rotating throats, including a mandate to stop testing and make-a-decision, we are deciding between B&W Reverse Rotation throats, or stationary throats.

IPSC has increased duct pressure. Two past cases have shown that with the larger sizing of the rotating throat port, DP and PA flow parameters can be improved. The large port size B&W throat is expected to provide adequate performance when judged against these parameters. As a general rule with the throat designs tested, as the port openings increase with a throat, it is more likely to meet a 95% feeder speed criteria. However, coal fineness can be reduced to below acceptable levels. Caution must be followed, as a throat opening that is too large, may have serious consequences.

Maintenance Costs

It is agreed by all, that the purchase and installation of rotating throats saves money with regard to the maintenance budget.

The figure of $1,620,000 is based on a summary statement of costs and savings generated by the Maintenance Department. Disagreement and debate could be made about the particulars used to generate the figure, but it is agreed that mill life has been extended and maintenance money saved with the use of rotating throats.

A comparison could be generated between costs and savings experienced by both Maintenance and Operations if required.

Note: The term "Reverse Rotation" used in the previous table and throughout this paper, is a bit of a misnomer. The term refers to the orientation of the vanes within a port. It does not refer to the direction of the table and throat rotation.